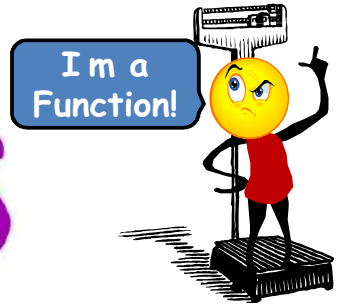
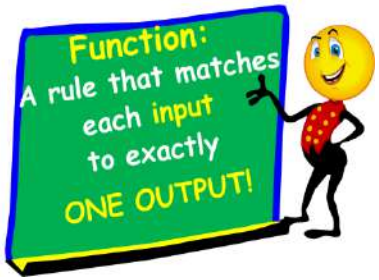
Intro to Functions

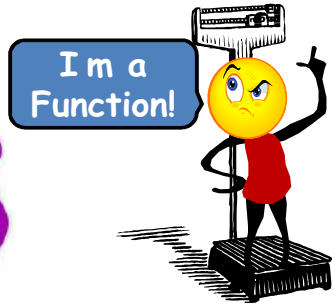


MATH PUPIL

MATH FOR THE VISUAL LEARNER



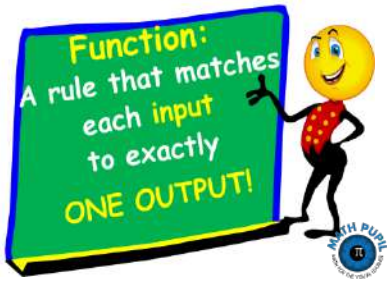
Intro to Functions



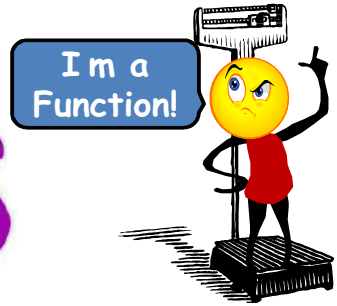
What will you learn in this lesson?

Algebra Benchmarks and Indicators

1) You will define a 'function'.



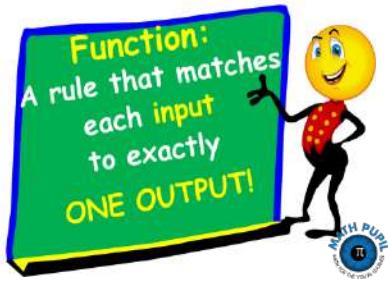
Intro to Functions



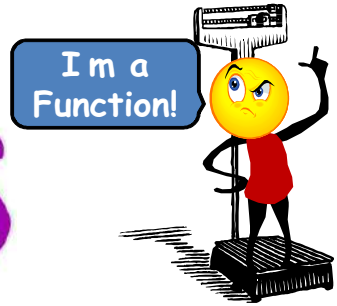
What will you learn in this lesson?

Algebra Benchmarks and Indicators

2) You will compare a 'relation' with a 'function'.



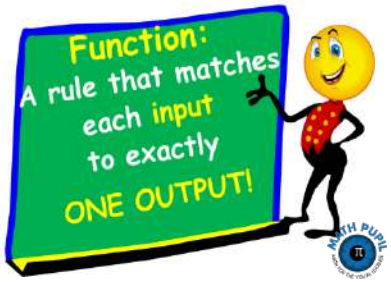
Intro to Functions



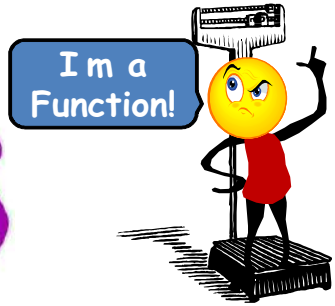
What will you learn in this lesson?

Algebra Benchmarks and Indicators

3) You will contrast a 'relation' with a 'function'.



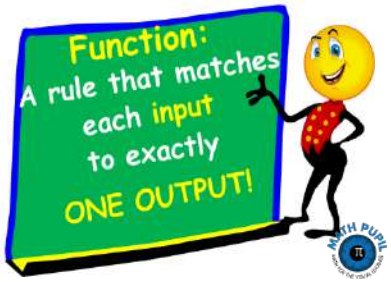
Intro to Functions



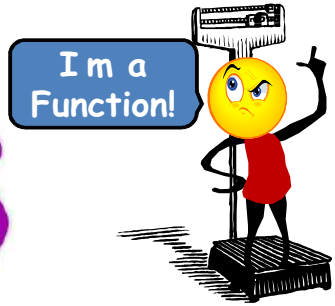
What will you learn in this lesson?

Algebra Benchmarks and Indicators

4) You will state whether a set of ordered pairs is a '**function**' or just a '**relation**'.



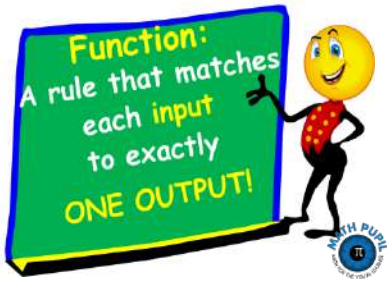
Intro to Functions



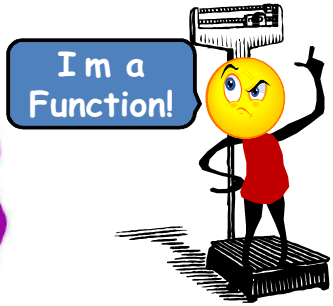
What will you learn in this lesson?

Algebra Benchmarks and Indicators

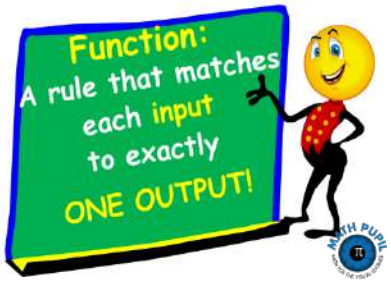
5) You will justify why a set of ordered pairs is OR is not a function.



Intro to Functions



What does that mean?



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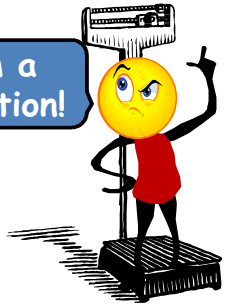
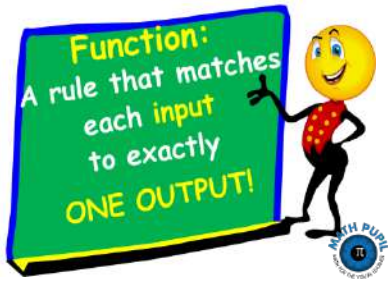
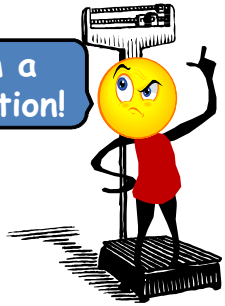


Let's find out!



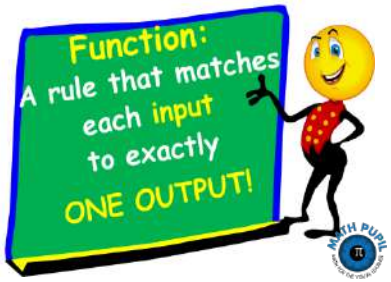
Intro to Functions



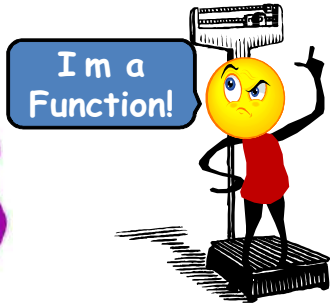
REVIEW

REVIEW

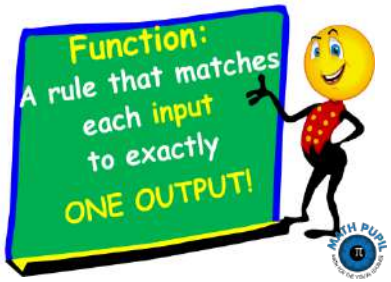
First, Let's review!



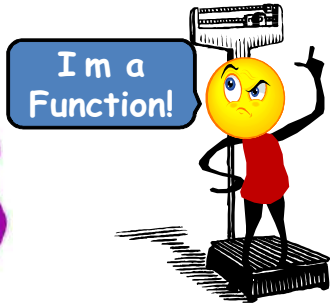
Intro to Functions



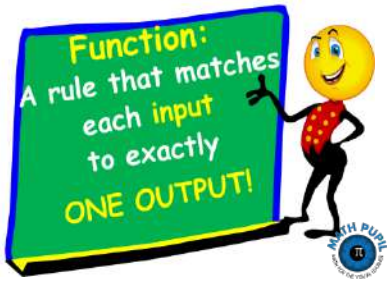
Part One:



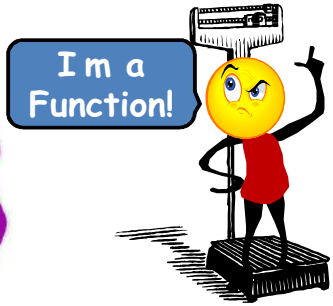
Intro to Functions



a) What is the difference between an ordered pair and a relation?

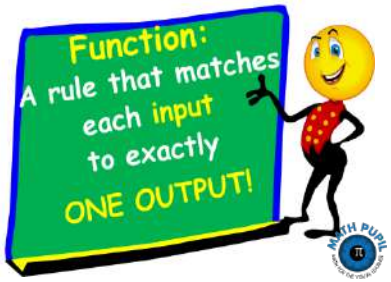


Intro to Functions

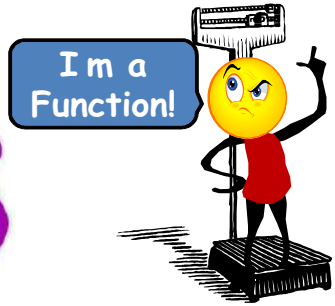


i) An ordered pair has **two** numbers (the '**x**' and '**y**' coordinates).

Example: $(3, 5)$ — x y



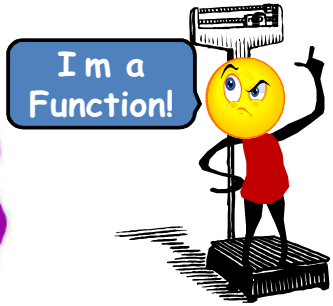
Intro to Functions



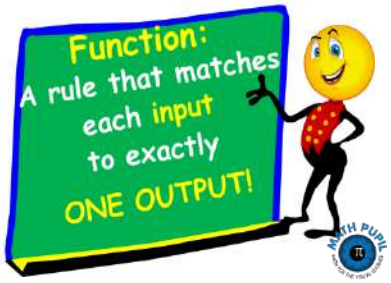
ii) A relation can have many (sets) of ordered pairs.

Example: $\{(\overset{x}{3}, \overset{y}{5}), (\overset{x}{-2}, \overset{y}{0}), (\overset{x}{1.1}, \overset{y}{\frac{1}{2}})\}$

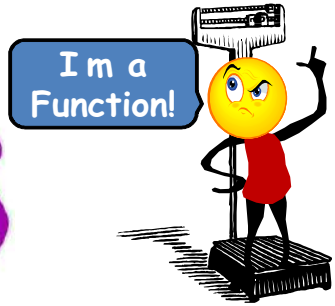
Intro to Functions



b) List the domain, range and inverse of the following relation.



Intro to Functions



x	-8,	-1,	0,	7
y	4,	3,	0,	3

Domain: ( )

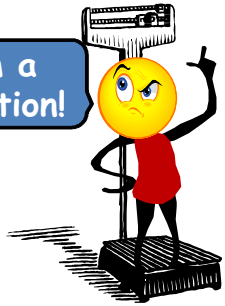
Range: ( )

Inverse:

4	3	0	3
-8	-1	0	7

We already have a '3'!

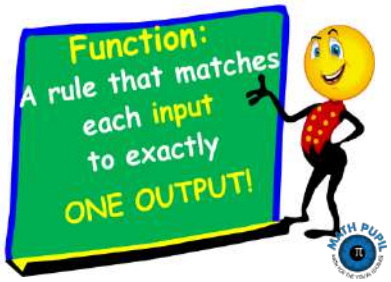
Intro to Functions



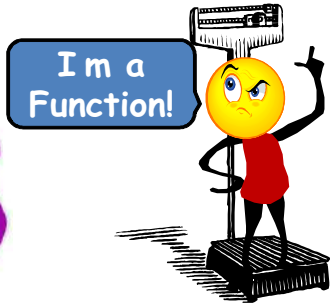
LESSON

LESSON

Let's begin the Lesson!

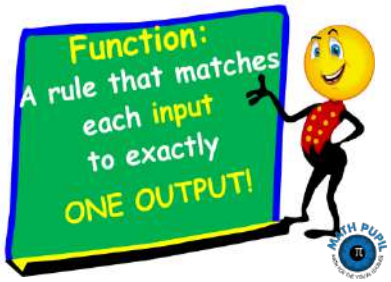


Intro to Functions

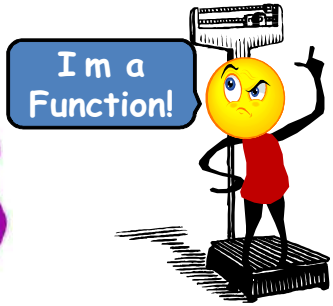


Part Two:

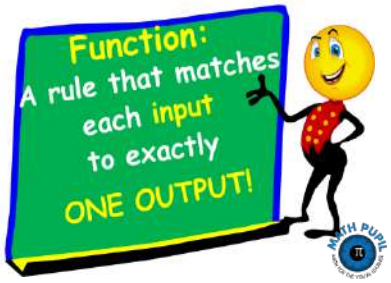
Functions



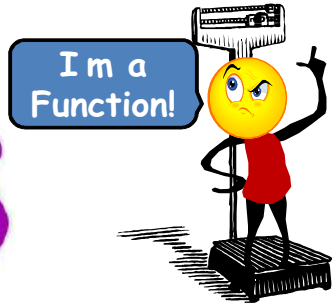
Intro to Functions



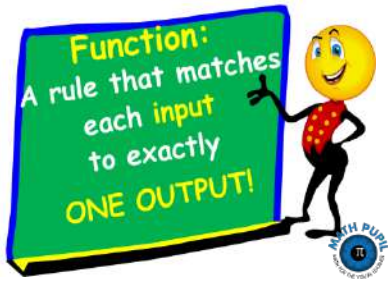
Introduction:



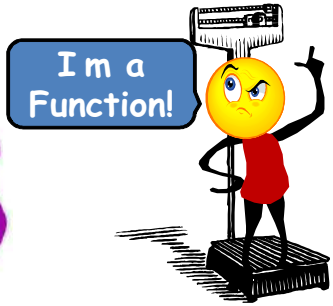
Intro to Functions



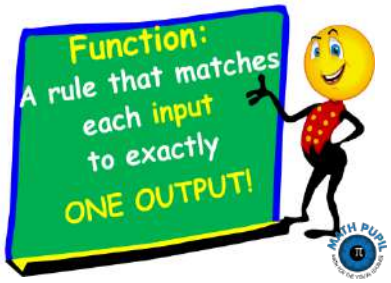
In the last lesson, we learned about relations.



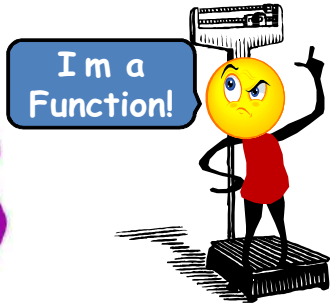
Intro to Functions



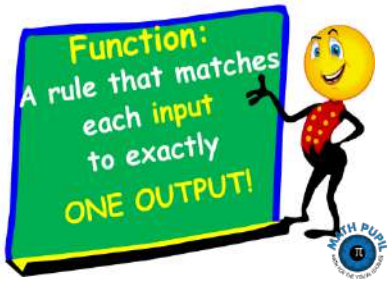
In this lesson, we are going to learn about functions!



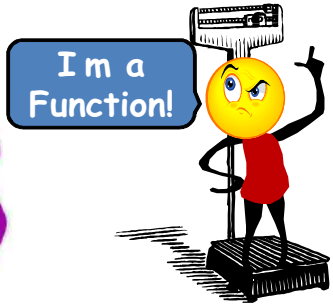
Intro to Functions

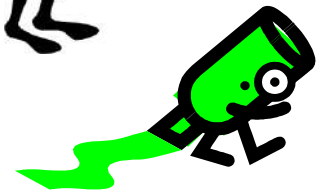


1) What is a function?



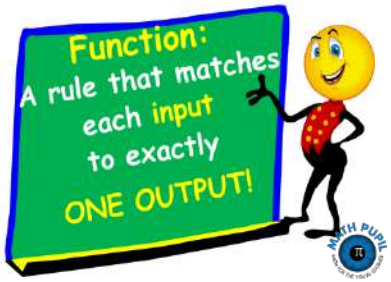
Intro to Functions



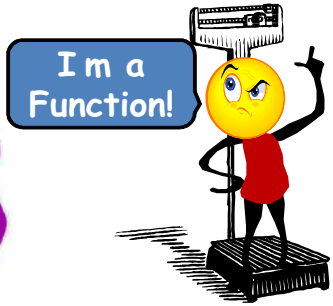


Definition Depot:

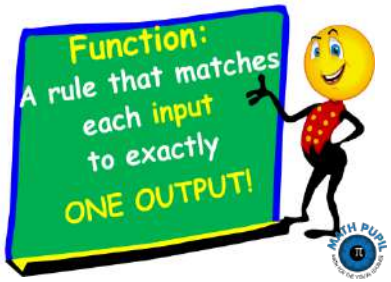
A function is a relation that contains a rule that maps each input value to exactly one output value.



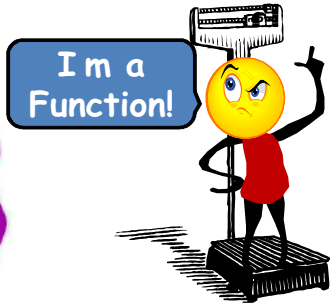
Intro to Functions



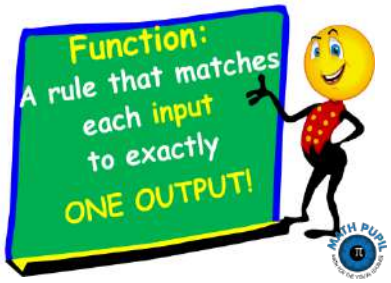
Yikes!
What does that mean?



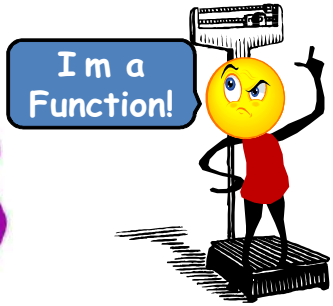
Intro to Functions



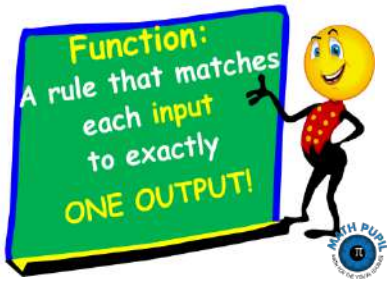
**A function is like getting weighed. Watch!



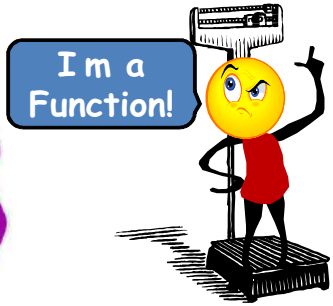
Intro to Functions



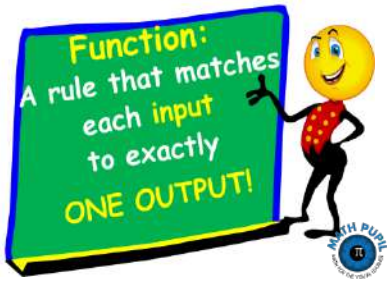
2) We're in the weight room weighing



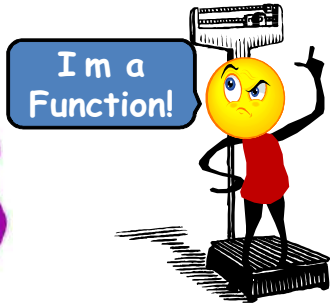
Intro to Functions



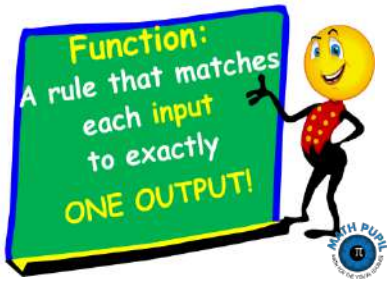
our wrestlers for today's match!



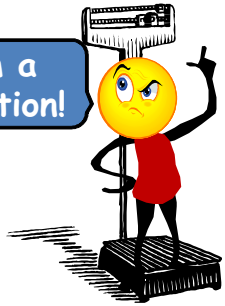
Intro to Functions



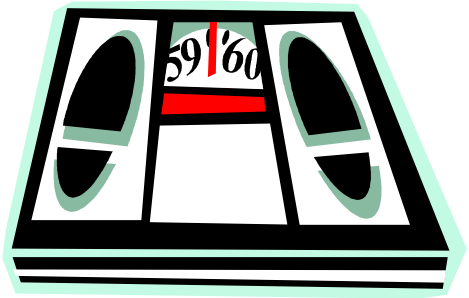
As we weigh each player, fill in the chart with their names and weight.

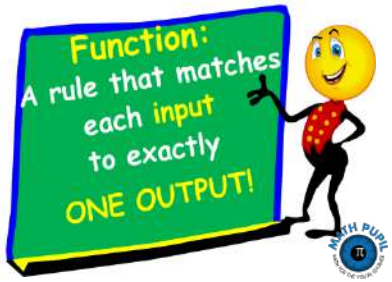


Intro to Functions



Wrestlers	Weight





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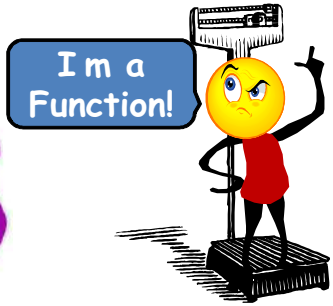
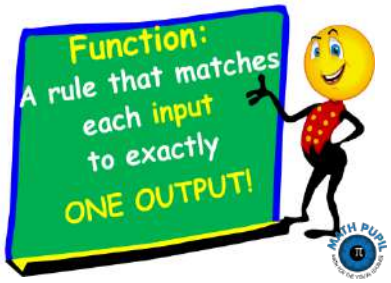
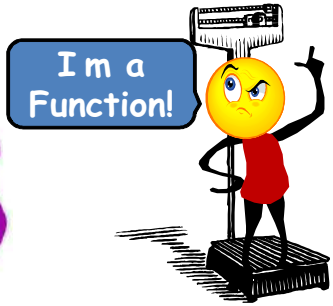


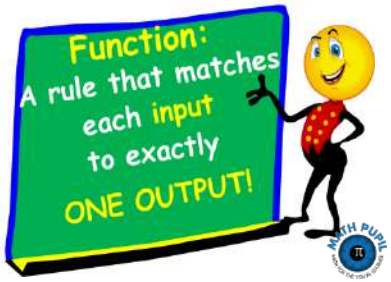
3) Tyrone is the first to be weighed.



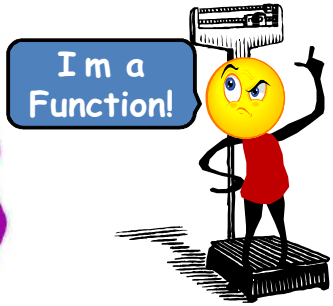
Intro to Functions



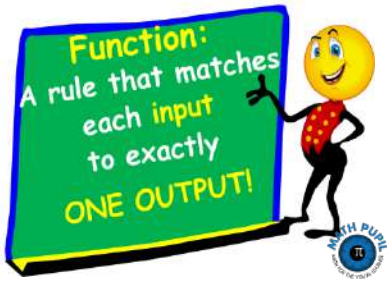
Wrestlers	Weight
Tyrone	200



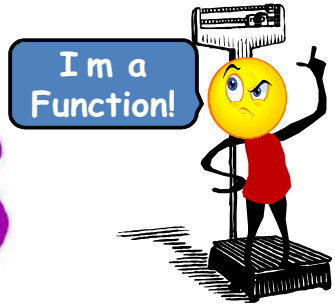
Intro to Functions



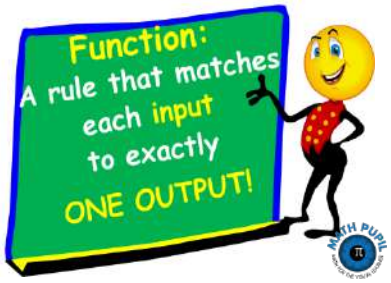
NOTE: Tyrone cannot weigh two amounts at the same time.



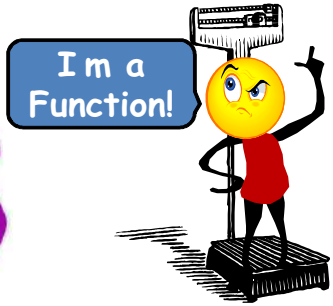
Intro to Functions



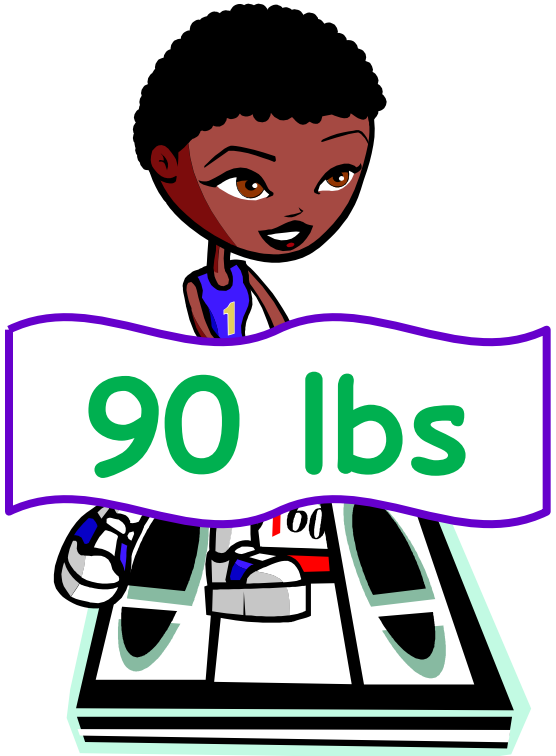
4) Javon is the next to get weighed.

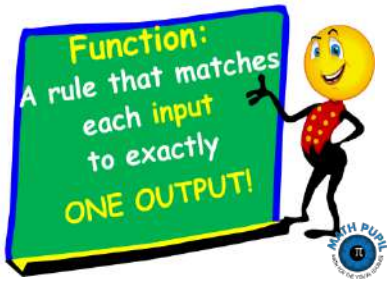


Intro to Functions

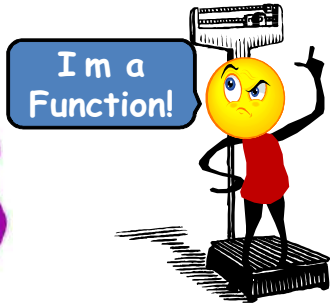


Wrestlers	Weight
Tyrone	200
Javon	90

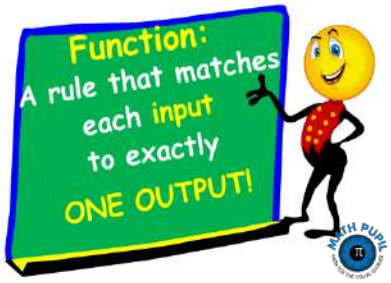




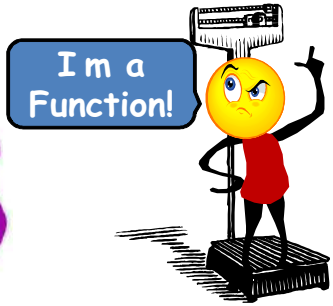
Intro to Functions



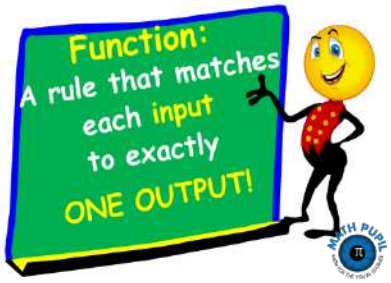
NOTE: Javon cannot weigh two amounts at the same time.



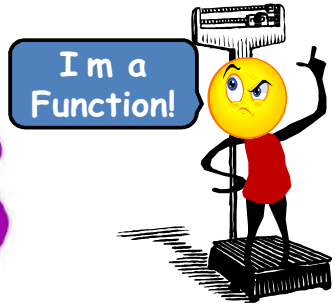
Intro to Functions



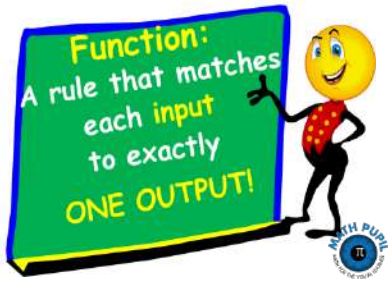
5) Herbert is the next to get weighed.



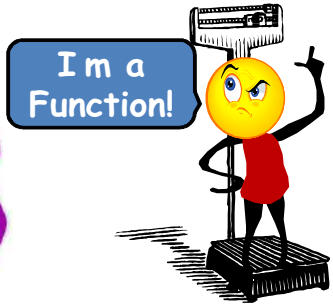
Intro to Functions



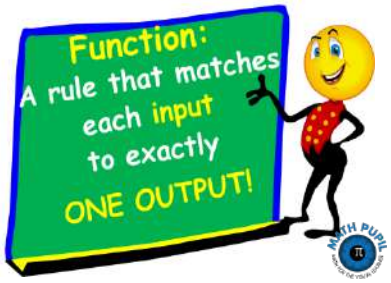
Wrestlers	Weight
Tyrone	200
Javon	90
Herbert	100



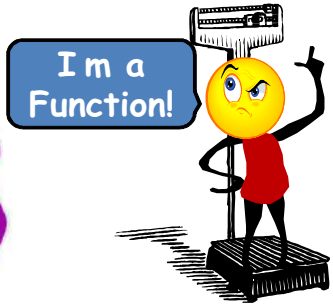
Intro to Functions



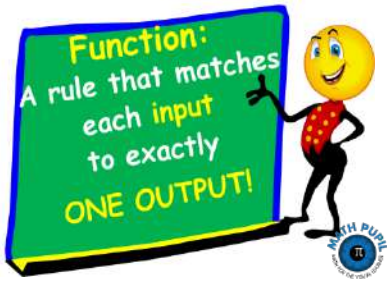
NOTE: Herbert cannot weigh two amounts at the same time.



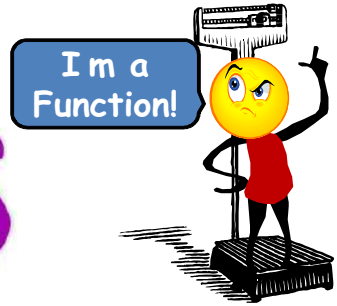
Intro to Functions



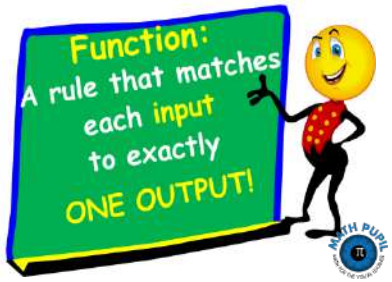
6) Alex is the last to get weighed



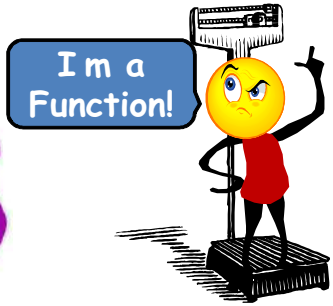
Intro to Functions



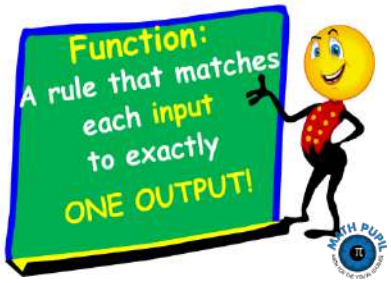
Wrestlers	Weight
Tyrone	200
Javon	90
Herbert	100
Alex	200



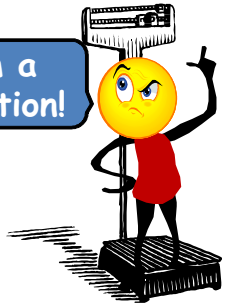
Intro to Functions



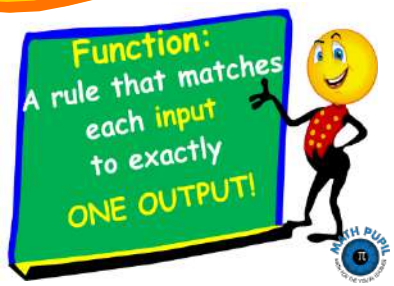
NOTE: Alex cannot weigh two amounts at the same time.



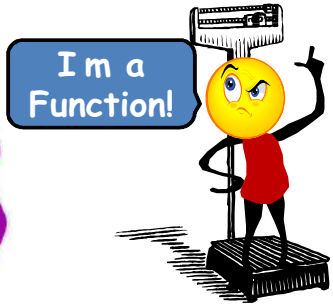
Intro to Functions



7) How is weighing wrestlers like a function?

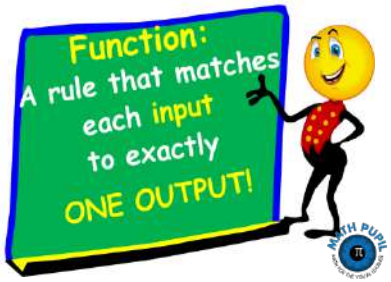


Intro to Functions

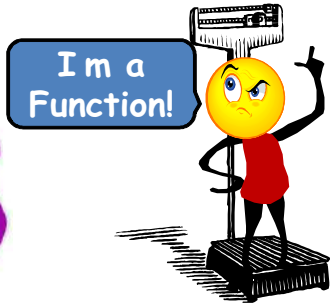


Answer:

Each wrestler has exactly one weight.

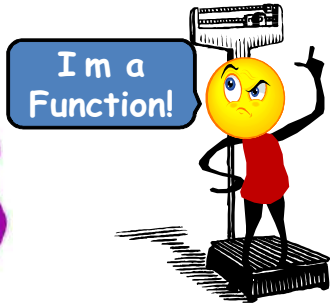


Intro to Functions



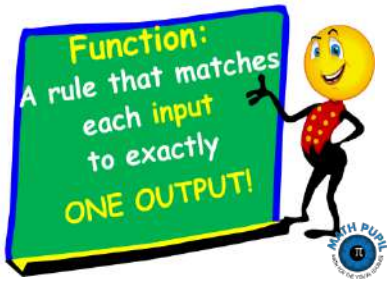
Wrestlers	Weight
Tyrone →	200
Javon →	90
Herbert →	100
Alex →	200

Intro to Functions

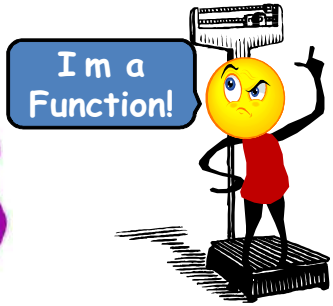


Answer:

It is possible for two guys to weigh the same…

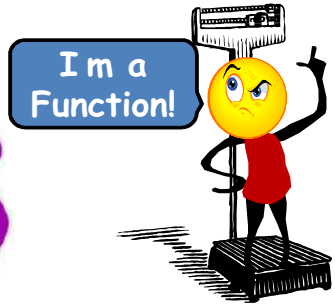


Intro to Functions



Wrestlers	Weight
Tyrone	200
Javon	90
Herbert	100
Alex	200

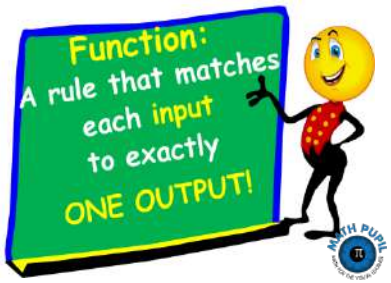
Intro to Functions



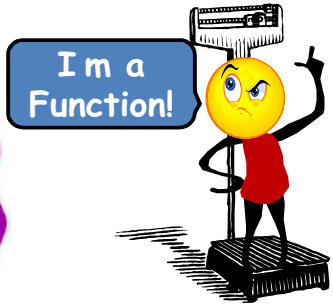
Answer:

…but it is not possible for Tyrone to weigh 200 lbs …

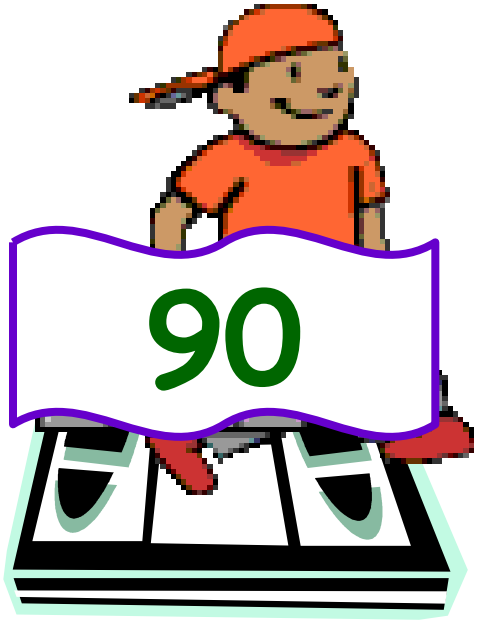
and 90 lbs at the same time.

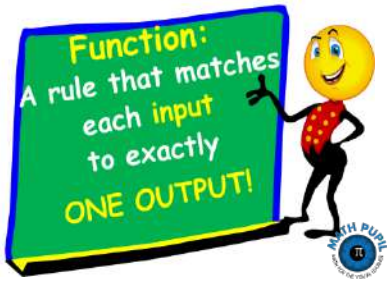


Intro to Functions

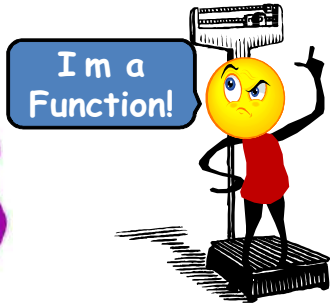


Wrestlers	Weight
Tyrone	200
Tyrone	90



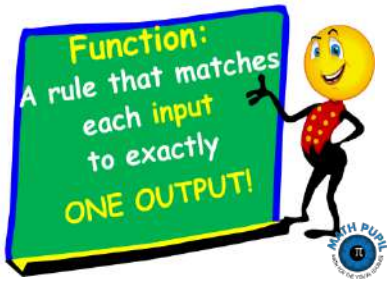


Intro to Functions

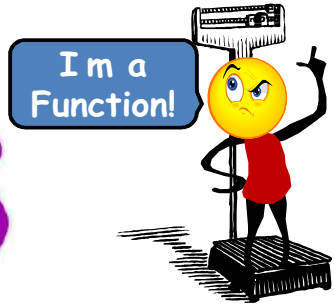


Answer:

In a function, each input must have exactly one output.

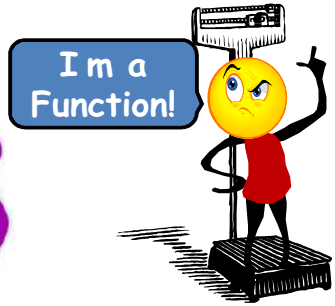


Intro to Functions



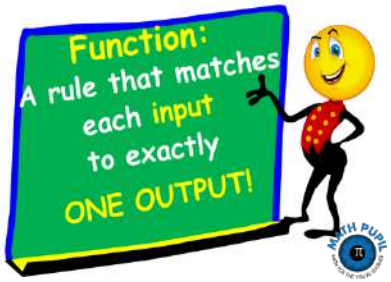
Writers	Input	Output
Tyrone	→	200
Javon	→	90
Herbert	→	100
Alex	→	200

Intro to Functions

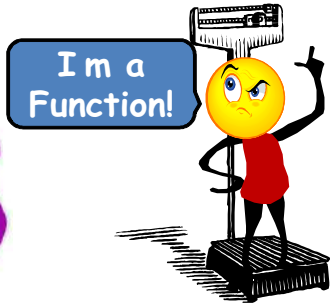


Answer:

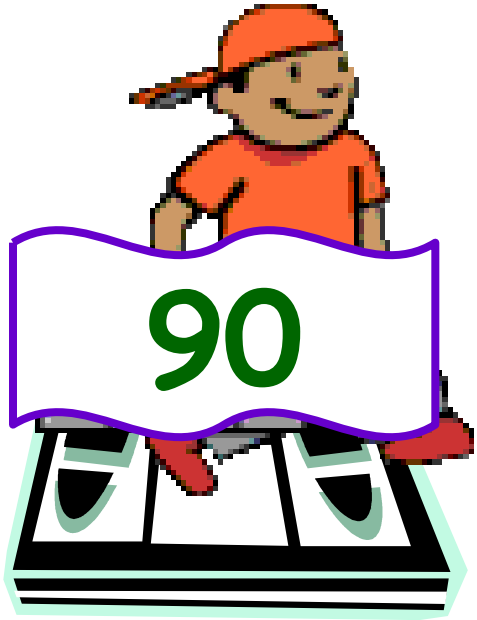
It is not a function when an input (wrestler) has two different outputs (weights).

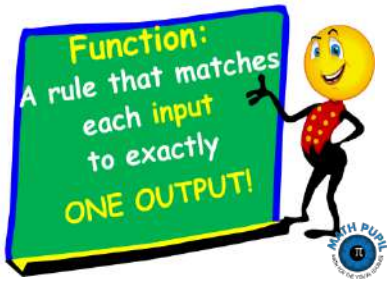


Intro to Functions

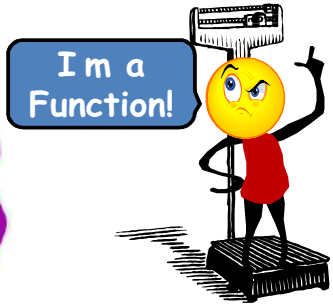


Input	Output
Tyrone	200
Tyrone	90

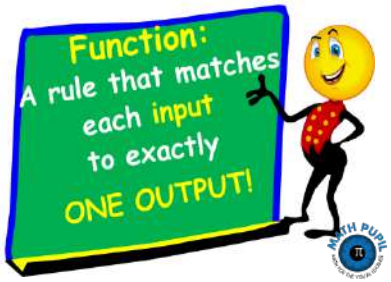




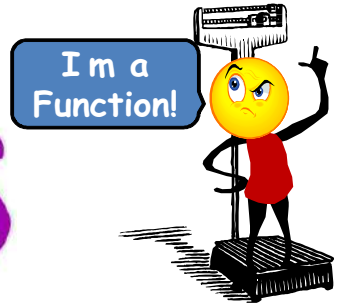
Intro to Functions



8) Can you think of another real life example that would represent the concept of a function?



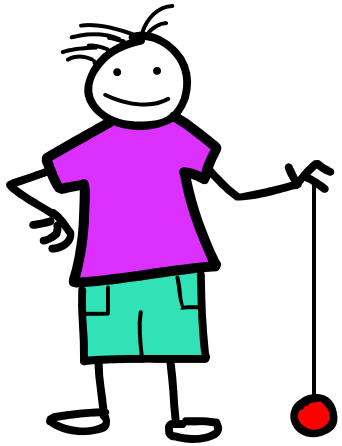
Intro to Functions

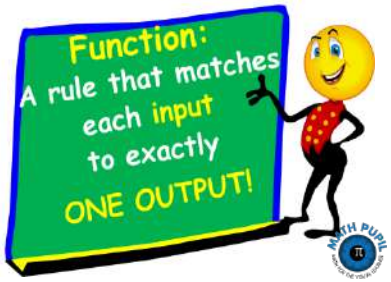


Answer:

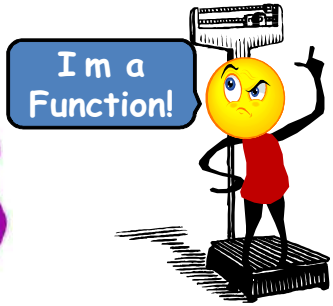
This is a YOYO answer!

You're On Your Own!

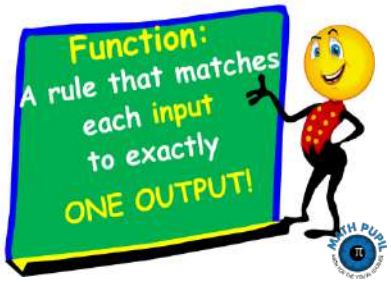




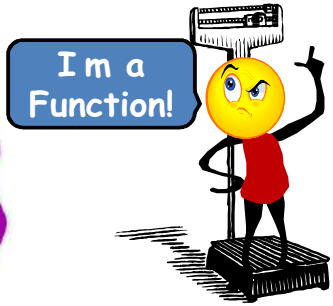
Intro to Functions



**When you are finished with your example, share it with a partner.

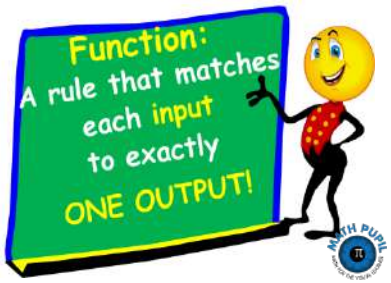


Intro to Functions

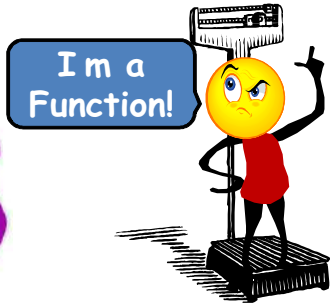


My Example of a Function:

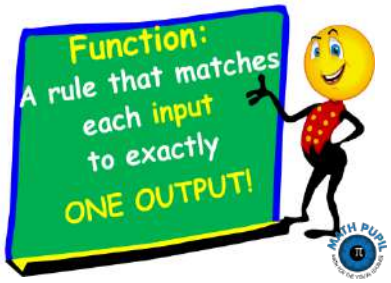
The number of calories in a specific size candy bar



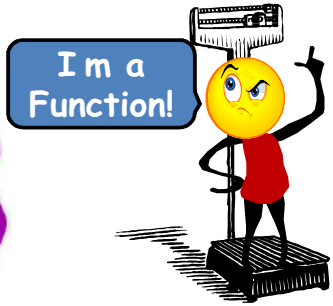
Intro to Functions



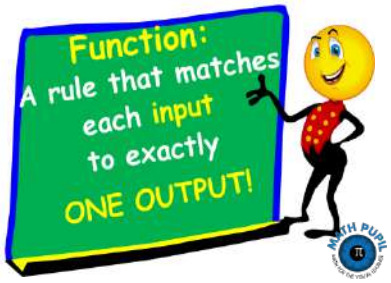
9) Now that you can define a relation and a function,



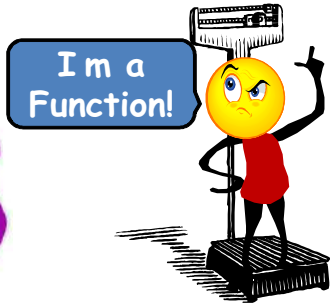
Intro to Functions



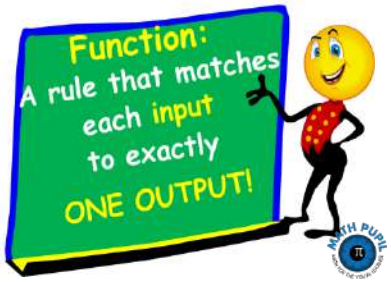
identify three similarities (compare) between the two concepts.



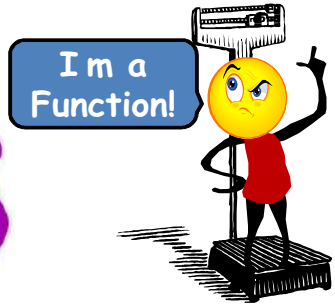
Intro to Functions



Don't FORGET!



Intro to Functions



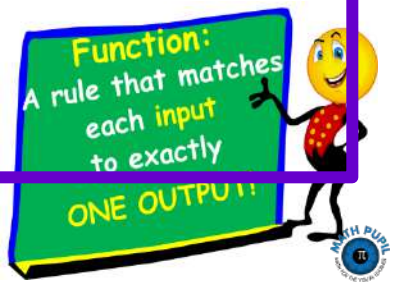
Similarities

Relation:

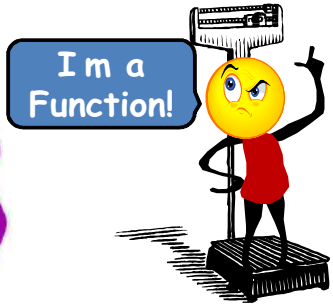
1) *A set of ordered pairs.*

Function:

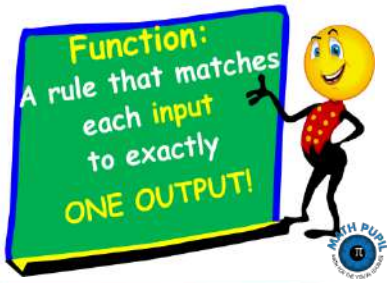
1) *A set of ordered pairs*



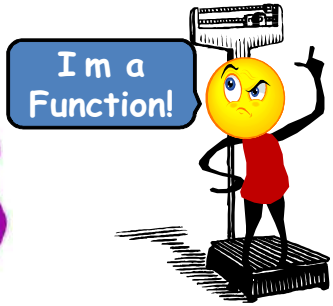
Intro to Functions



Don't FORGET!



Intro to Functions



Similarities

Relation:

1) *A set of ordered pairs.*

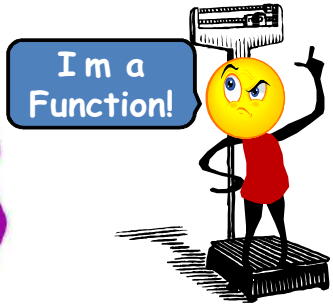
2) Has a domain (input)

Function:

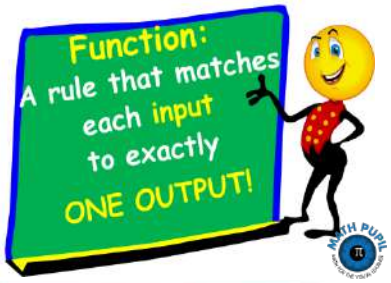
1) *A set of ordered pairs*

2) Has a domain (input)

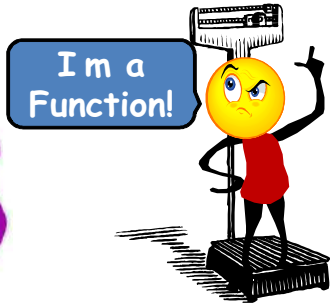
Intro to Functions



Don't FORGET!



Intro to Functions



Similarities

Relation:

1) A set of ordered pairs.

2) Has a domain (input)

3) Has a range (output)

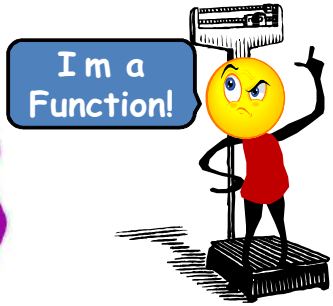
Function:

1) A set of ordered pairs

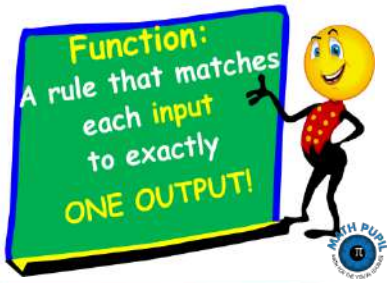
2) Has a domain (input)

3) Has a range (output)

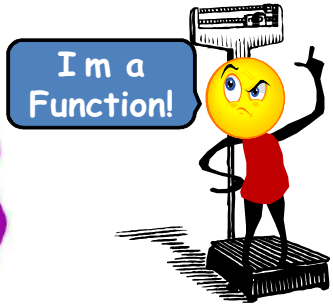
Intro to Functions



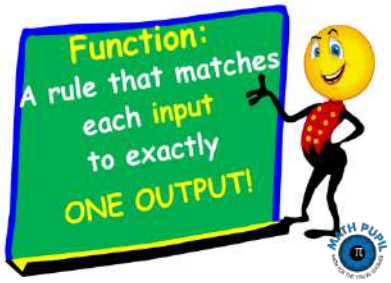
Don't FORGET!



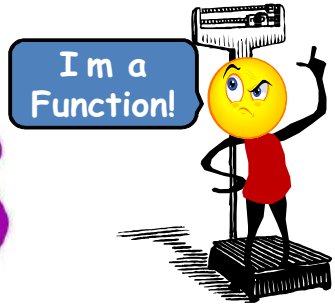
Intro to Functions



10) What is the major difference between a relation and a function? (Contrast)



Intro to Functions



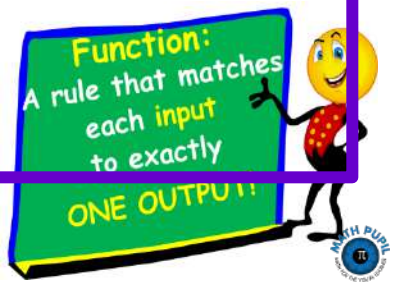
Difference:

Relation:

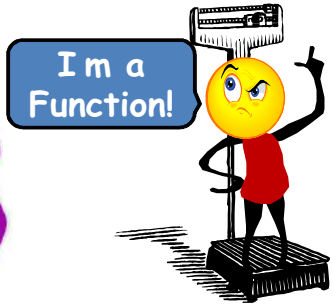
Each input can have many different outputs.

Function:

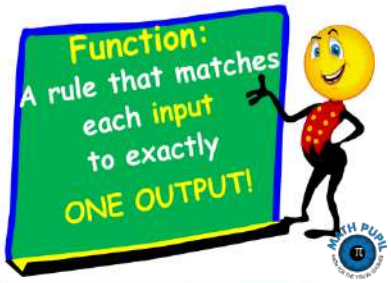
Each input must have exactly ONE output.



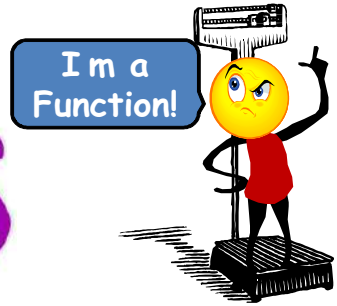
Intro to Functions



Don't FORGET!

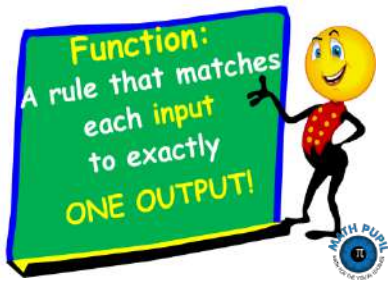


Intro to Functions

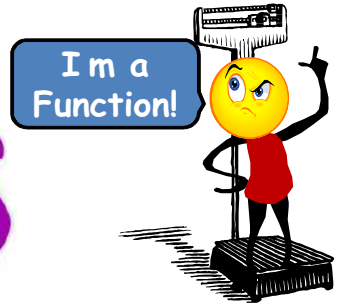


NOTE:

ALL FUNCTIONS <u>ARE</u> RELATIONS!

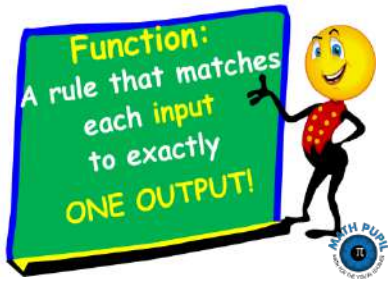


Intro to Functions

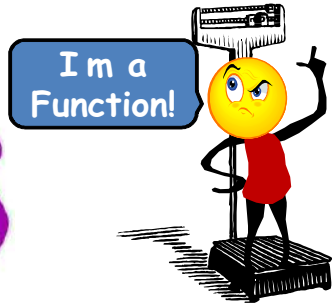


BUT...

NOT ALL RELATIONS ARE FUNCTIONS!

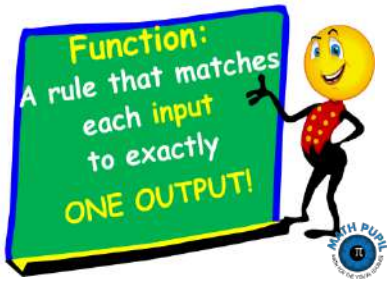


Intro to Functions

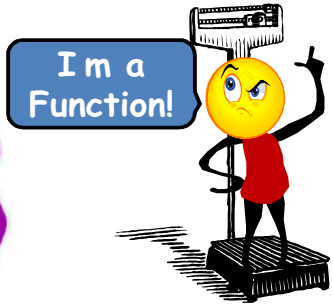


Part Three:

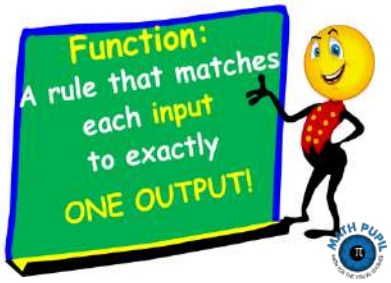
Check for Understanding!



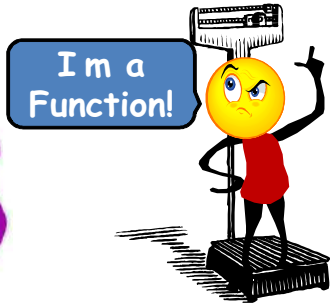
Intro to Functions



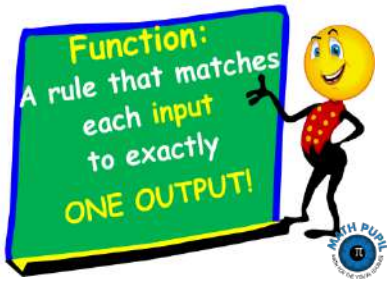
Directions:



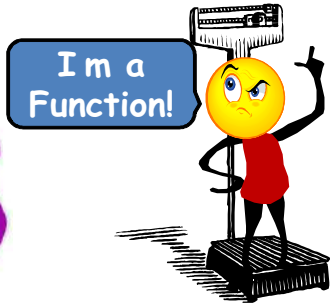
Intro to Functions



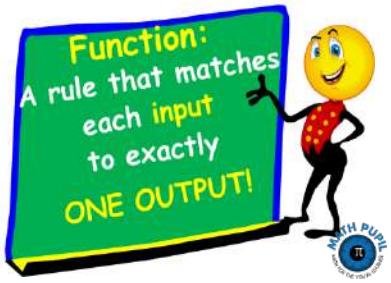
Determine whether the following relations are functions.



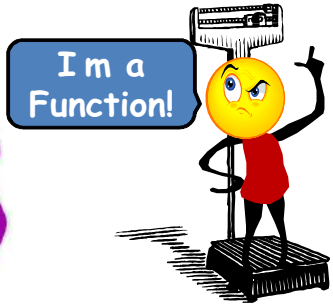
Intro to Functions



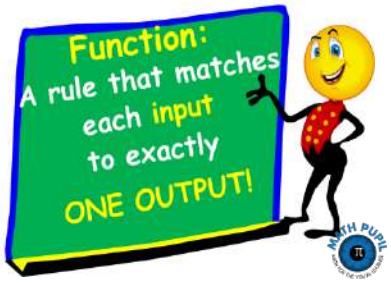
Justify your response.



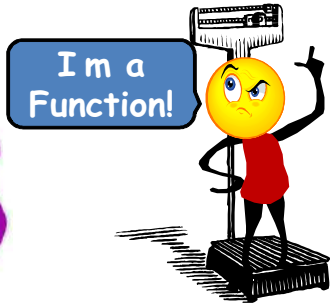
Intro to Functions



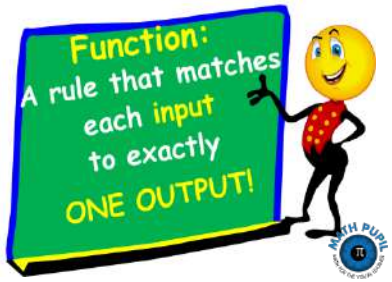
Problem 1:



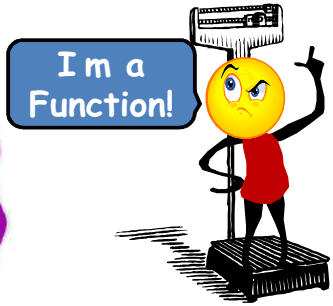
Intro to Functions



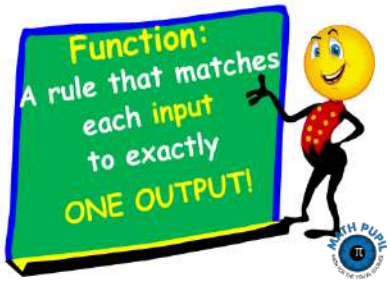
x	y
2	-3
3	-6
5	-8
2	4



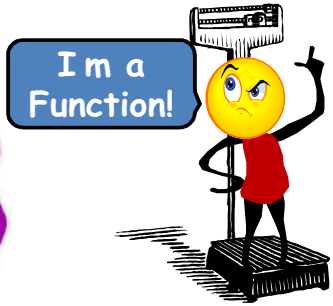
Intro to Functions



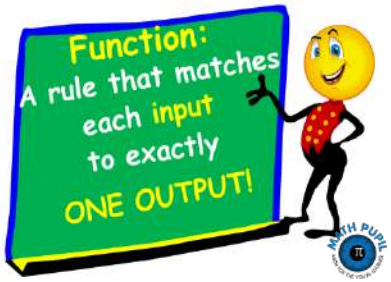
Step 1: Ask yourself the following question…



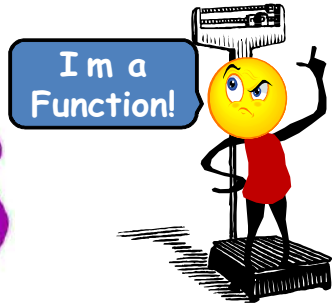
Intro to Functions



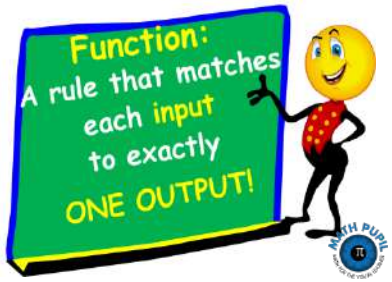
"Are there any repeating 'x' values?"



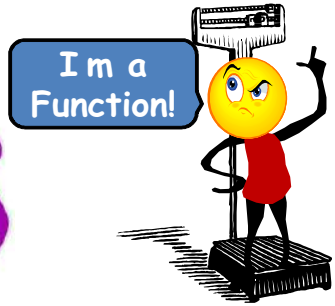
Intro to Functions



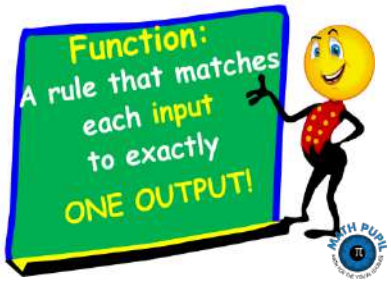
x	y
2	-3
3	-6
5	-8
2	4



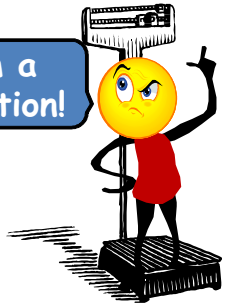
Intro to Functions



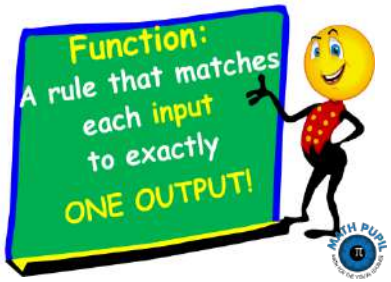
Step 2: If there are repeating 'x' values, ask yourself,



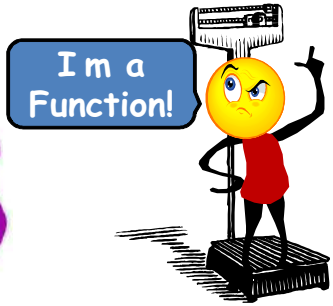
Intro to Functions



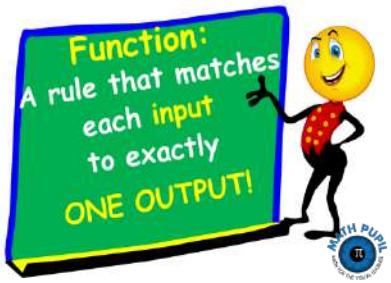
"Do the 'x' values weigh the same? (or have the same output)?"



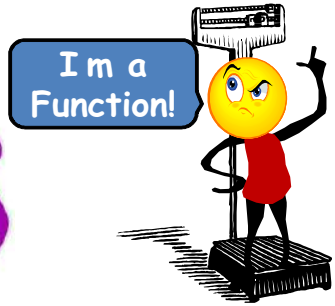
Intro to Functions



x	y
2	-3
3	-6
5	-8
2	4



Intro to Functions



x	y
2	-3
3	-6
5	-8
2	4

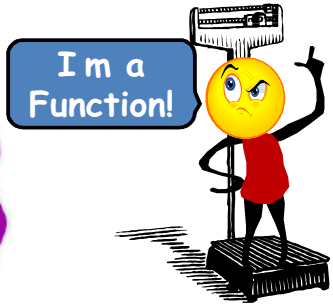
Answer:

This relation is NOT a function.

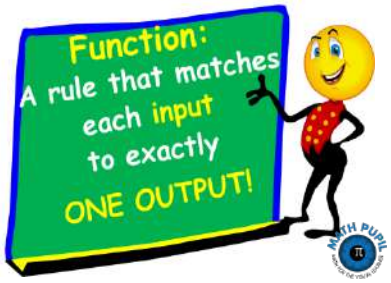
Justify:

The input '2' has two different outputs (weights)

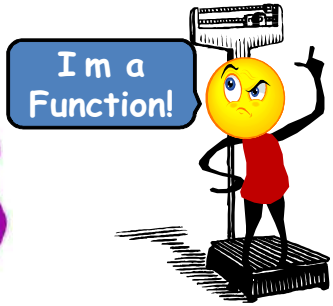
Intro to Functions



Problem 2:



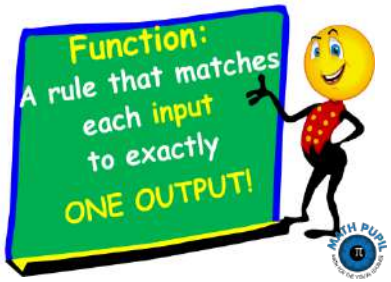
Intro to Functions



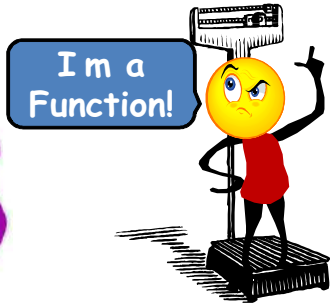
x	-7	0	-4	8
y	2	3	5	2

Answer: This relation is a function.

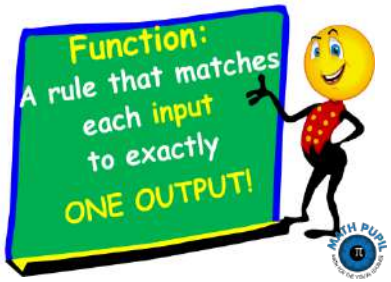
Justify: Each input has exactly one output.



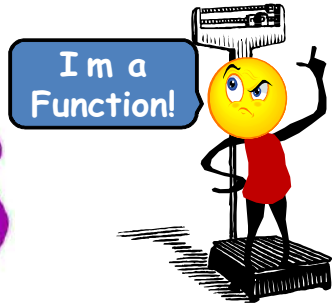
Intro to Functions



11) How do you know that Problem 2 represents a relation?



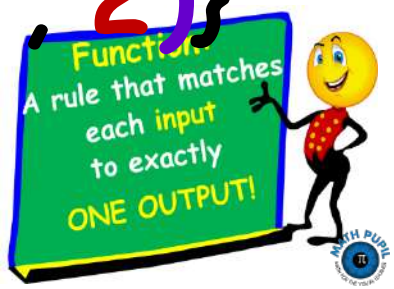
Intro to Functions



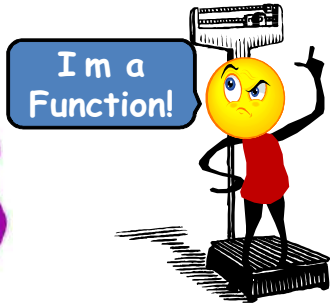
x	-7	0	-4	8
y	2	3	5	2

Answer: A relation is a set of ordered pairs.

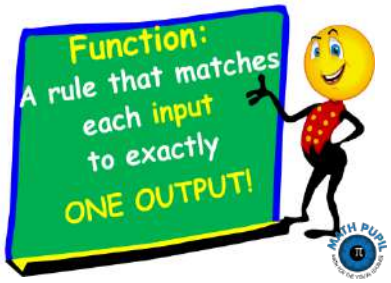
$$\{(-7, 2), (0, 3), (-4, 5), (8, 2)\}$$



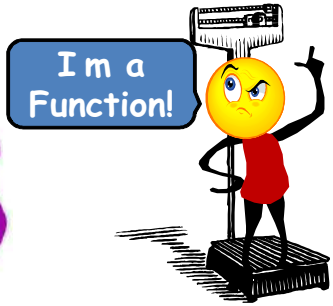
Intro to Functions



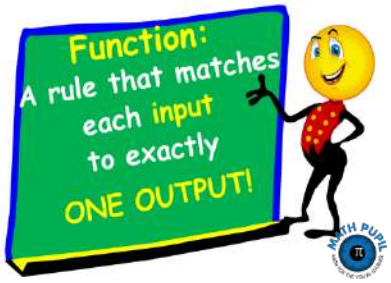
12) Is it possible for two different inputs to have the same output?



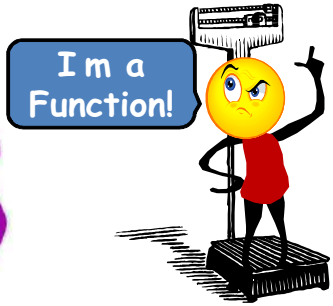
Intro to Functions



Justify your response.



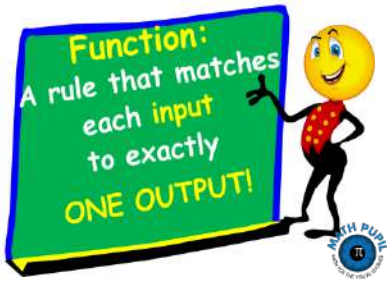
Intro to Functions



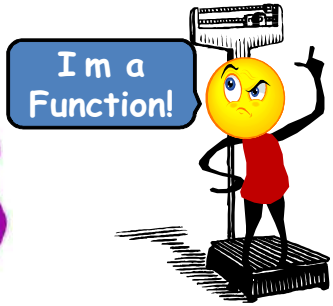
x	-7	0	-4	8
y	2	3	5	2

Answer: Yes!

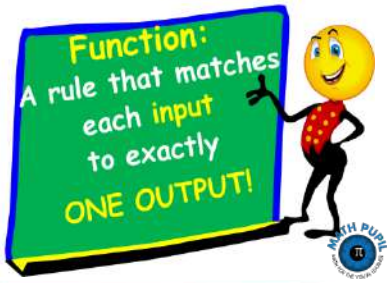
Justify:



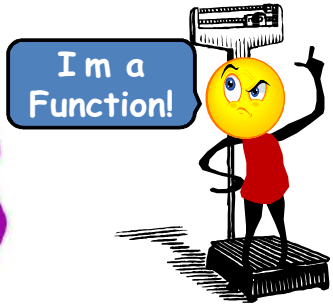
Intro to Functions



Don't FORGET!



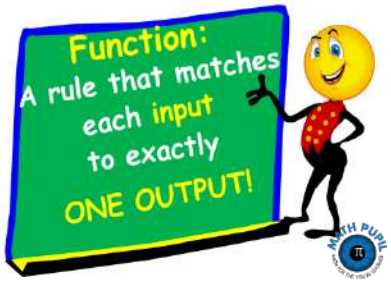
Intro to Functions



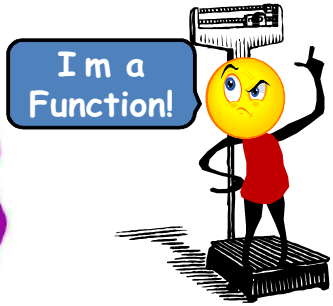
x	-7	0	-4	8
y	2	3	5	2

Answer: Yes!

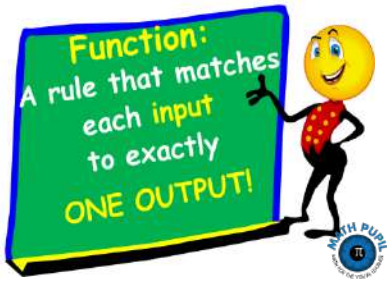
Justify: Two different people (inputs) can have the same weight (



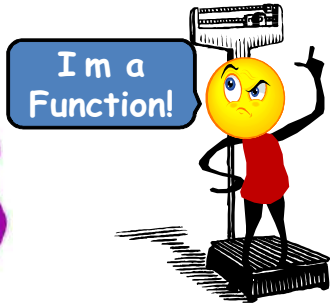
Intro to Functions



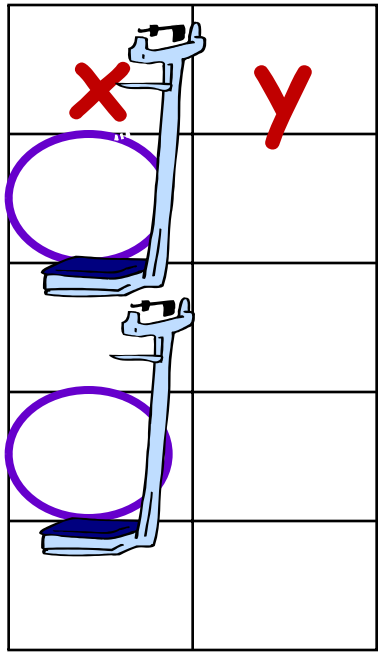
Problem 3:



Intro to Functions



$$\{(-4, 5), (1, 5), (-4, 5), (9, 5)\}$$

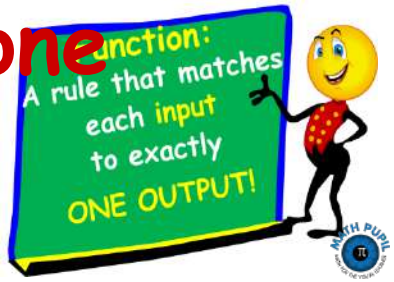


Answer:

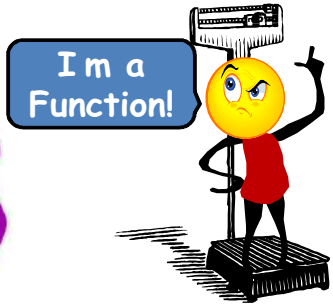
This relation is a function.

Justify:

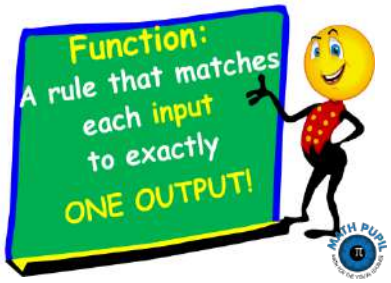
Each input has exactly one output.



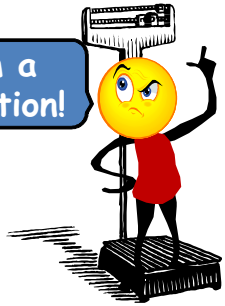
Intro to Functions

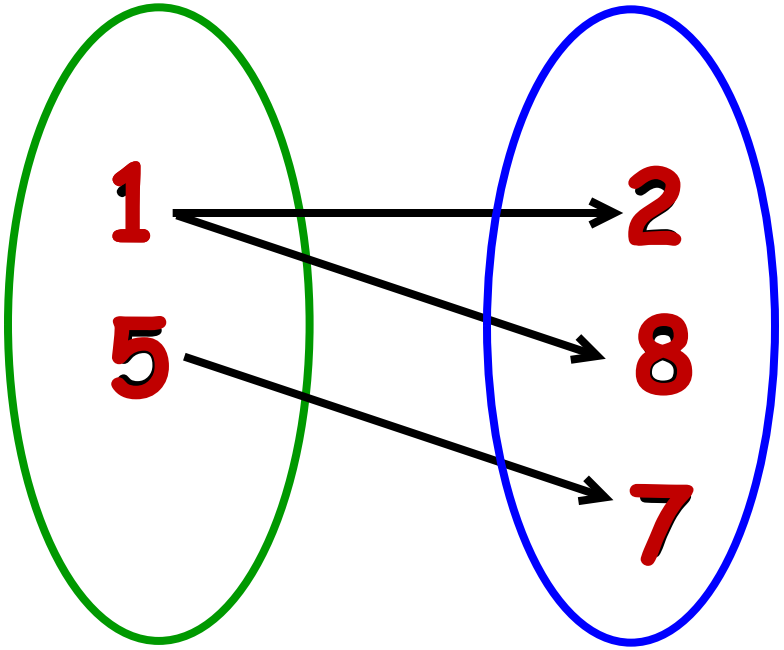


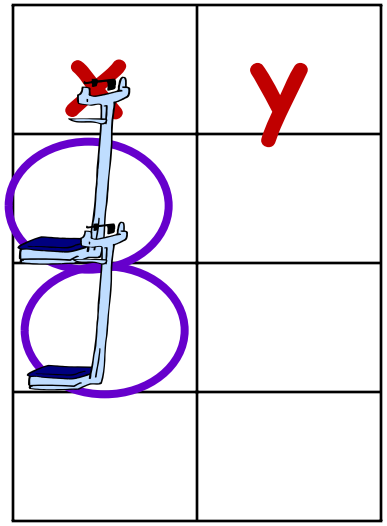
Problem 4:



Intro to Functions

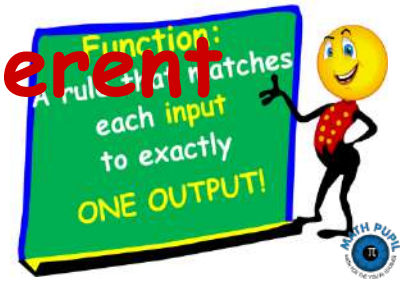




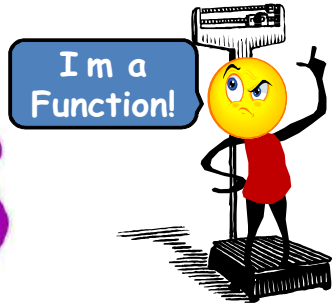


Answer: This relation is NOT a function.

Justify: The input '1' has two different outputs.



Intro to Functions



YOU DO!

THE NEXT EXAMPLES ARE CALLED "YOU DO" PROBLEMS! THIS MEANS...

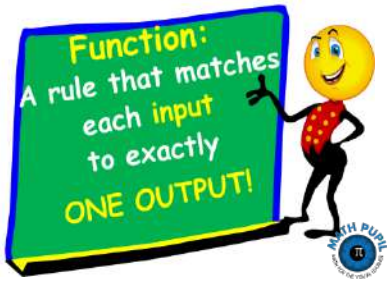
YOU DO! YOU DO!

YOU DO!

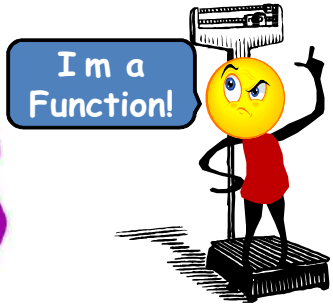
YOU DO THE PROBLEMS BY YOURSELF.

YOU DO!

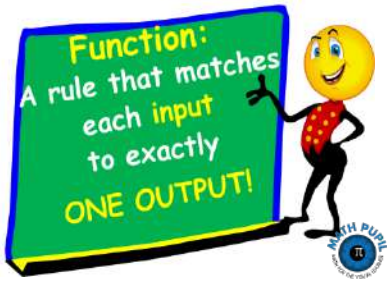
YOU DO!



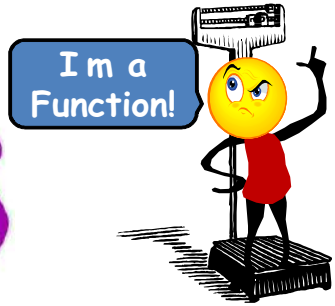
Intro to Functions



Problem 5:



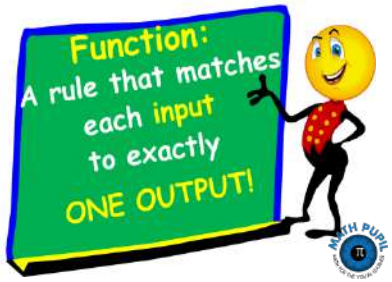
Intro to Functions



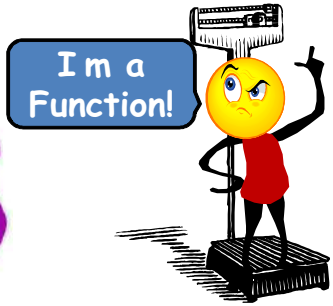
Answer:

x	y
2	4
6	8
8	4
10	8

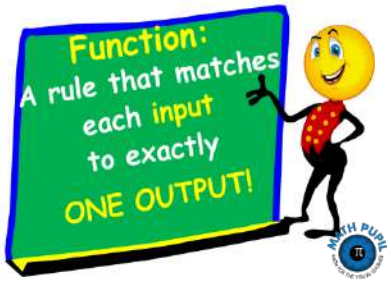
Justify:



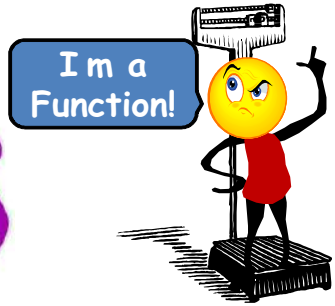
Intro to Functions

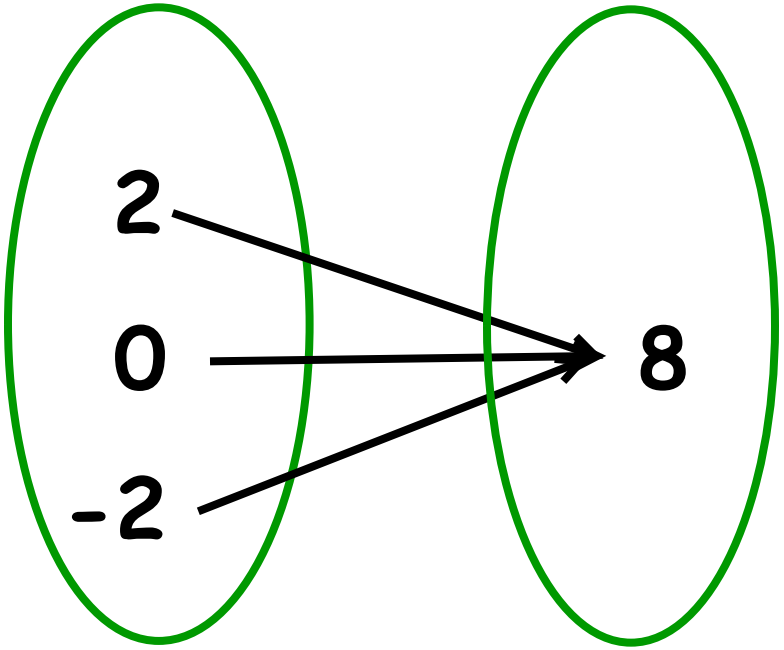


Problem 6:



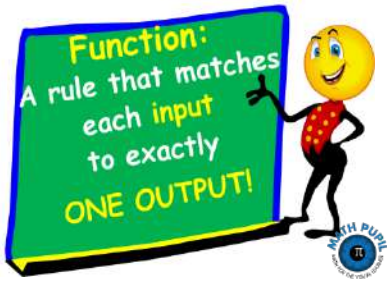
Intro to Functions



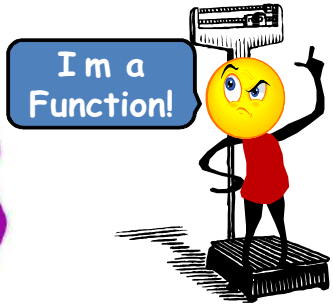


Answer:

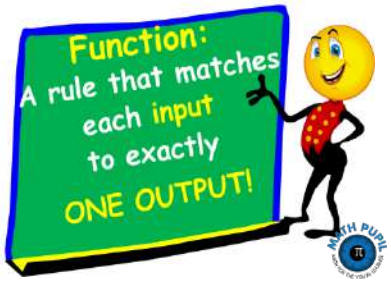
Justify:



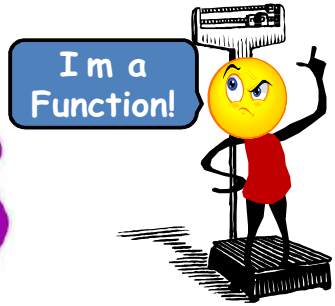
Intro to Functions



Problem 7:



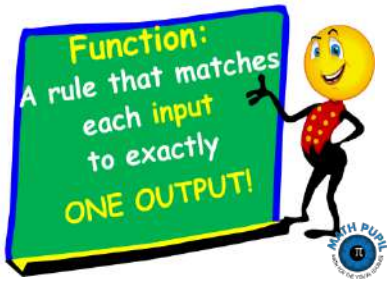
Intro to Functions



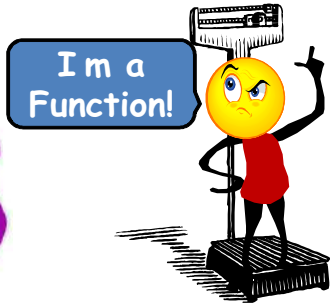
$\{(-3, 0), (0, 4), (-6, -4), (4, 12)\}$

Answer:

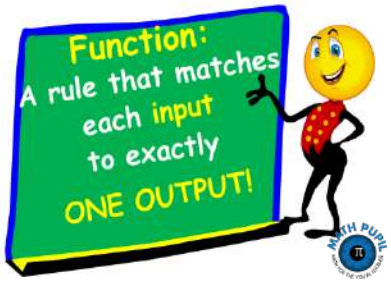
Justify:



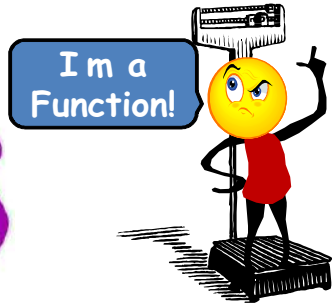
Intro to Functions



Problem 8:



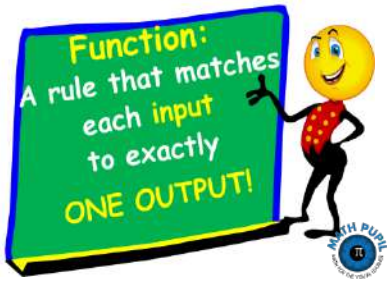
Intro to Functions



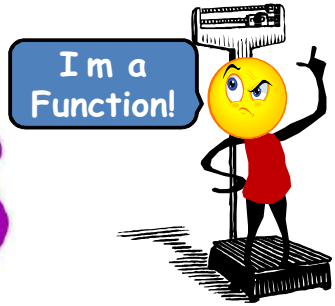
x	4	0	4	0
y	2	1	5	1

Answer:

Justify:



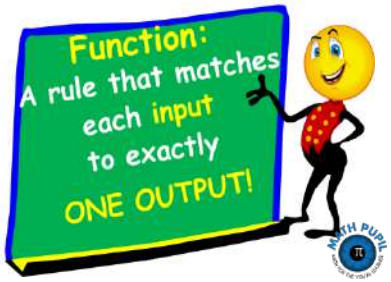
Intro to Functions



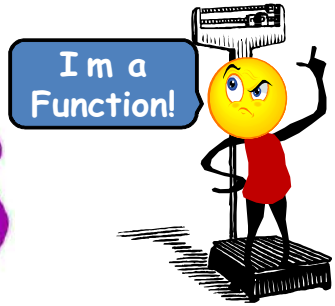
Did you learn the benchmarks?

Algebra Benchmarks and Indicators

1) Can you define a '**function**'?



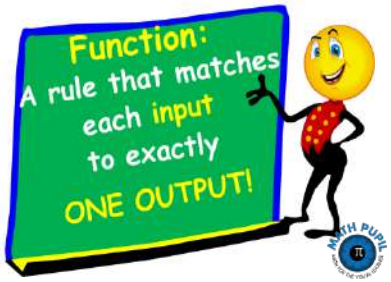
Intro to Functions



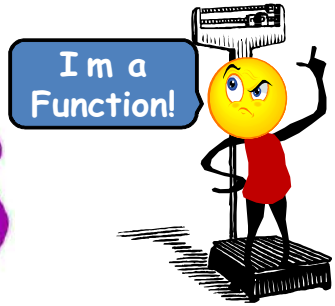
Did you learn the benchmarks?

Algebra Benchmarks and Indicators

2) Can you compare a 'relation' with a 'function'?



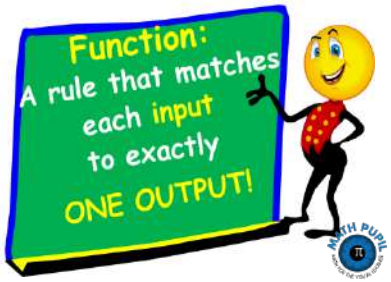
Intro to Functions



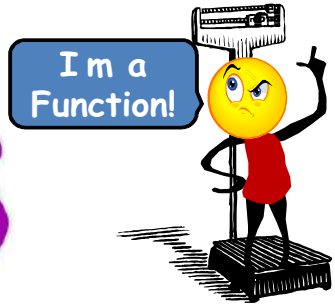
Did you learn the benchmarks?

Algebra Benchmarks and Indicators

3) Can you contrast a 'relation' with a 'function'?



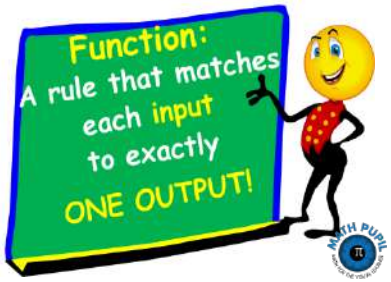
Intro to Functions



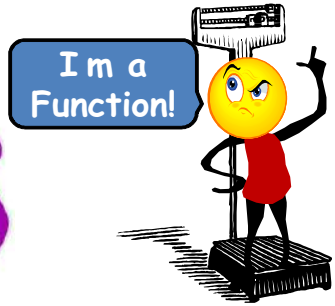
Did you learn the benchmarks?

Algebra Benchmarks and Indicators

4) Can you determine whether a set of ordered pairs is a 'function' or just a 'relation'?



Intro to Functions



Did you learn the benchmarks?

Algebra Benchmarks and Indicators

5) Can you justify why a set of ordered pairs is OR is not a function?