

**?**

**W2K**

**Lesson Question**

**Words to Know**

*Fill in this table as you work through the lesson. You may also use the glossary to help you.*

**Identify**

functions.

functions from

scenarios.

are

**Determine** if

**Determine** if relations

are

from tables, graphs, and equations.

**Lesson Goals**

|  |  |
| --- | --- |
| function | a relation in which each element of the input is mapped to  (paired with) exactly element of the output |
| input | a value that is transformed by a process and becomes |
| output | the result of an that has been transformed by a process |



**W2K**

**Words to Know**

**Input / Output Table**

*Fill in the missing values in the table.*

Input

*y* = 4(−2) + 5

(*x*, *y*)

*y* = −8 + 5

*y* =

(0,

)

*y* = 4(1) + 5

*y* = + 5

*y* = 9

ordered pair

*y* = 4*x* + 5

|  |  |
| --- | --- |
| relation | a set of pairs |
| vertical line test | a test showing that if any vertical line passes through no more than one point of the graph of a relation, then the relation is  a |

|  |  |
| --- | --- |
| ***x*** | ***y*** |
| −2 | −3 |
| −1 | 1 |
| 0 | 5 |
| 1 |  |
| 2 | 13 |

**Slide**

**Identifying Functions**

***y*** = ***x*2** − **3** The input 9 is paired with function two different outputs.

***y*2** = ***x***

a function

A **function** is a **relation** in which one **input** is paired with exactly

**output**.



**Tables of Equations**

* Equations are functions or not functions.

*y*2 = *x* + 12

*x*2 + *y*2 = 9

*y* = 3*x* + 4

not a function

a function

|  |  |
| --- | --- |
| ***x*** | ***y*** |
| −3 | −3 |
| −3 | 3 |
| 4 | −4 |
| 4 | 4 |

|  |  |
| --- | --- |
| ***x*** | ***y*** |
| −3 | 0 |
| 0 | −3 |
| 0 | 3 |
| 3 | 0 |

|  |  |
| --- | --- |
| ***x*** | ***y*** |
| −4 | −8 |
| −1 | 1 |
| 1 | 7 |
| 4 | 16 |

**2**

**4**

|  |  |
| --- | --- |
| ***x*** | ***y*** |
| −3 | 6 |
| −1 | −2 |
| 3 | 6 |
| 5 | 22 |

|  |  |
| --- | --- |
| ***x*** | ***y*** |
| 9 | −3 |
| 1 | −1 |
| 9 | 3 |
| 25 | 5 |

**Slide**

# Function and Non-Function Equations

## EXAMPLE

**Functions**

**4**

*y* = 4

1

*y* = 2 *x* + 3

1 = *y* − 5*x y* = *x*2 + 4

*y* = *x*2 + 3*x* −12

They all have = somewhere

in the equation. So that’s what makes these all functions. *y* is going to equal

number.

## Not Functions

*x* = −6

*y*2 = *x* + 4

*y*2 + *x*2 = 25

It’s not a function if you have

= some number, or if you have in the equation.

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**The Vertical Line Test**

Consider the points in the following table: *Plot the points from the table on the*

*coordinate plane and draw the line through them.*

**Vertical line test:** If any vertical line passes through no more than

point, then the relation is

a

.



**Functions Versus Non-Functions**

•

•

a Function

*y*

*x*

*x*

Each line passes through exactly

point on the graph.

The vertical lines go through

than one point.

*y*

*y*

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  | *x* |
|  |  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | *y* |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  | *x* |
|  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |  |

**8**

|  |  |
| --- | --- |
| ***x*** | ***y*** |
| −3 | −4 |
| −1 | 0 |
| 1 | 4 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | |  |  |  | *y* |  |  |  |  |  |
|  |  |
|  |  |  |  |  |  | 4 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  | 2 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  | *x* |
|  | 4 |  |  | 2 |  |  |  |  |  | 2 |  | 4 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  | 2 |  |  |  |  |  |  |
|  |  |  |  |  |  | 4 |  |  |  |  |  |  |
|  |  |  | |  |  | |  |  | |  |  |  |

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# Determine Whether a Real-World Relationship is a Function

## REAL-WORLD CONNECTION

Determine if the following scenario represents a function.

Is the height of a football kicked across a field a function of the time? The is a function of the .

**12**



*y*

60

50

40

Height (feet)

30

20

10

*x*

1

2

3

4

5

6

Time (seconds)

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**12**



# Determining Whether a Real-World Relationship is a Function

## EXAMPLE

A survey asked high school math students their ages and heights. The results are shown in the table. Is the height a function of the age?

|  |  |
| --- | --- |
| **Age (yrs)** | **Height (in.)** |
| 15 | 60 |
| 16 | 62 |
| 16 | 67 |
| 17 | 65 |
| 18 | 63 |
| 19 | 64 |

This scenario is a function.

*Circle the points that represent an input with more than one output.*

**Height (in.)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 68 | *y* |  |  |  |  |  |
| 66 |  |  |  |  |  |  |
| 64 |  |  |  |  |  |  |
| 62 |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |
|  |  |  |  |  |  | *x* |
|  | 1 | 5 1 | 6 1 | 7 1 | 8 1 | 9 |

## Age (yrs)



**Summary** Introduction to Functions

**?**

What is a function and how can I identify one?

**Lesson Question**

**Answer**

*Use this space to write any questions or thoughts about this lesson.*