INVESTIGATE:
The ages and soccer practice of four students are listed.

Student	Age	Soccer Practice Day
Jay	15	Tuesday
Joe	16	Tuesday
Jen	15	Thursday
Jill	17	Saturday

For each of the given relations, state the **domain** and **range** and then determine whether or not the **relations** are **functions**.

a) students and the day for soccer practice
b) ages and the day for soccer practice

KEY WORDS

Ordered Pairs: Use braces {} to list the values, or elements, in a set. {(1,3), (2,5)}

Domain: the set of all values of the independent variable (x) of a relation.

Range: the set of all values of the dependent variable (y) of a relation.

Relation: a set of ordered pairs; values of the independent (x) variable are paired with values of the dependent (y) variable.

Function: a relation where each value of the independent variable corresponds with only **one** value of the dependent variable.

Method 1: ORDERED PAIRS (Set Notation)

a) students and the day for soccer practice
Write the relation as a set of ordered pairs.

{(Jay, Tuesday), (Joe, Tuesday), (Jen, Thursday), (Jill, Saturday)} RELATION between students and practice day

*Read the definition of **domain** and **range.**List below.*
Domain = { Jay, Joe, Jen, Jill }
Range = { Tuesday, Thursday, Saturday }

*Read the definition of **relation** and **function**.*
Conclusion: Is this relation a function? **Justify.**

This relation is a function because each independent value (kids) correspond to only one value of dependent (day). If one of the kids had a soccer practice on two different days, it would not be a function.

b) ages and the day for soccer practice
Write the relation as a set of ordered pairs.

{(15, Tue), (16, Tue), (15, Thu), (17, Sat)}

Relation between ages and practice day

*Read the definition of **domain** and **range.** List below.*
Domain = { 15, 16, 17 }
Range = { Tue, Thu, Sat }

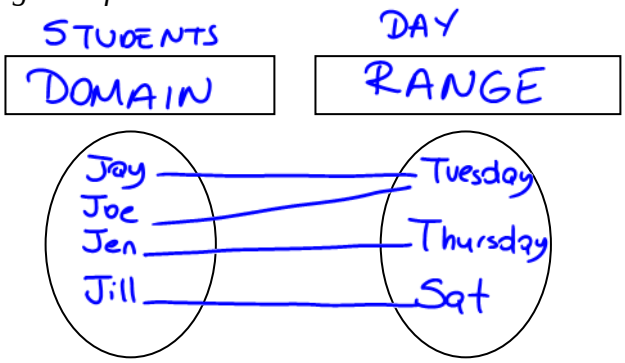
*Read the definition of **relation** and **function**.*
Conclusion: Is this relation a function? **Justify.**

This relation is not a function because there is a repeating "x" value.

Same "x" cannot match with different "y" values.

Method 2: MAPPING DIAGRAM

a) students and the day for soccer practice
google "mapping diagram" and drew the mapping diagram of the relation below.

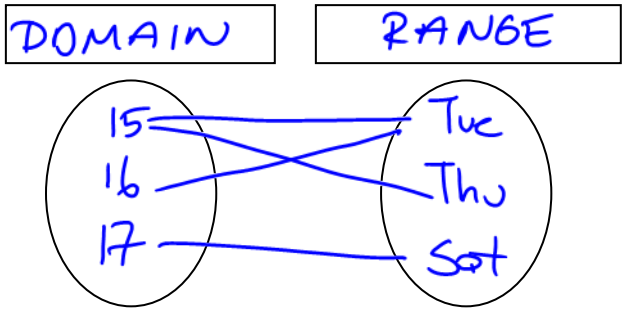


Domain = {Jay, Joe, Jen, Jill}
Range = {Tue, Thu, Sat}

Conclusion: Is this relation a function? **Justify.**

The relation between students and practice day is a function each "x" value matches with ONLY one "y" value

b) ages and the day for soccer practice
google "mapping diagram" and drew the mapping diagram of the relation below.



Domain = {15, 16, 17}
Range = {Tue, Thu, Sat}

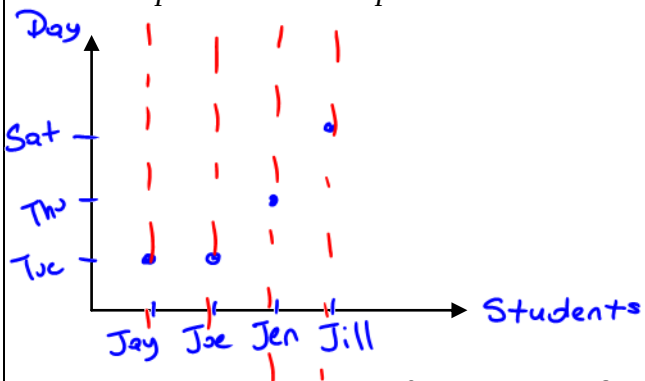
Conclusion: Is this relation a function? **Justify.**

It's not a function because "x" value (15) matches with two different y value.

Method 3: GRAPHING (Vertical Line Test)

VLT: *If any vertical line intersects the graph of a relation more than once, then the relation is not a function.*

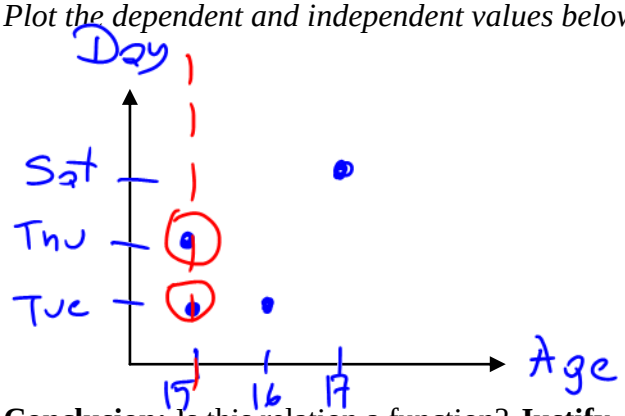
a) students and the day for soccer practice
Plot the dependent and independent values below.



Conclusion: Is this relation a function? **Justify.**

Function, passes VLT

b) ages and the day for soccer practice
Plot the dependent and independent values below.



Conclusion: Is this relation a function? **Justify.**

Not function b/c vertical line intersects more than one.

"All functions are relations, but not all relations are functions."

Method 4: EQUATION

If a relation is a function, **substituting** any value for x will result in only one value of y. Do you think all of the following relations are functions?

a) $y = 2x + 1$ Test $x=0$

$=2(0)+1$ Linear relation is a function

$y = 1$ when $x=0$ $y=1$

b) $x^2 + y^2 = 25$ → Circle Test $x=0$

$0^2+y^2=25$

$\sqrt{y^2}=\sqrt{25}$ square root each side

$y=\pm 5$

When $x=0$ y is either -5 or $+5$

Therefore, this relation is not a function

c) $y = 2x^2 - 3x + 1$ → this is a quadratic relation.

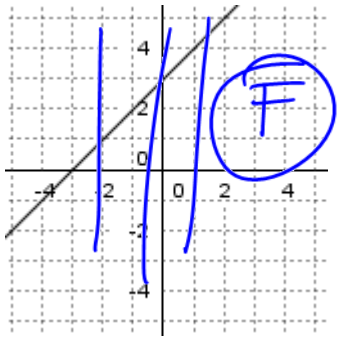
$=2(0)^2-3(0)+1$

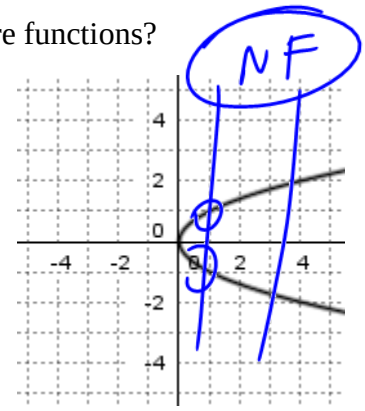
$y = 1$ when $x=0$ $y=1$

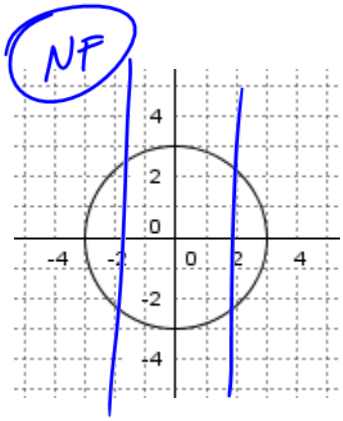
FUNCTION

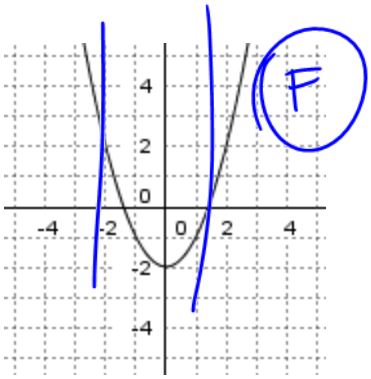
RIGHT PRACTICE MAKES PERFECT

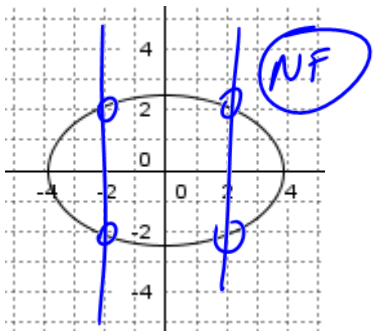
1) Looking at these graphs, which ones are functions?

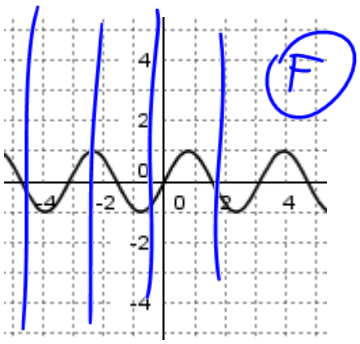












2) State if the following set of ordered pairs is a relation or function? **Justify.**

b) $\{(1,3),(2,4),(3,5),(4,6)\}$

Check for repeation "x" values

Function

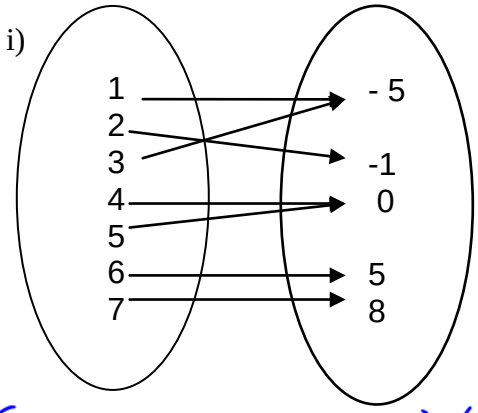
b) $\{(1,3),(1,4),(2,5),(3,6)\}$

"1" matches with 3 and 4.

Not function.

3. Use the mapping diagram:
a) write the set of ordered pairs of the relation
b) state if the relation is a function

i)

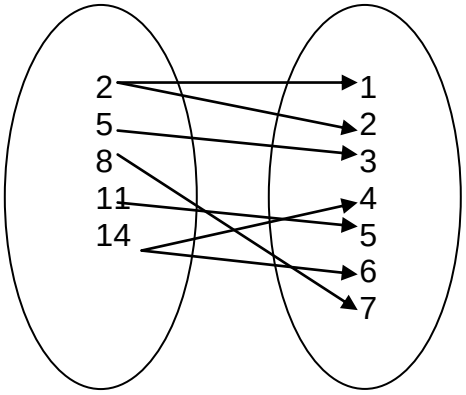


{(1,-5),(2,-1),(3,-5),(4,0),(5,0),(6,5),(7,8)}

Domain = {1,2,3,4,5,6,7}
Range = {-5,-1,0,5,8}

Function, one "x" matches one "y"

ii)

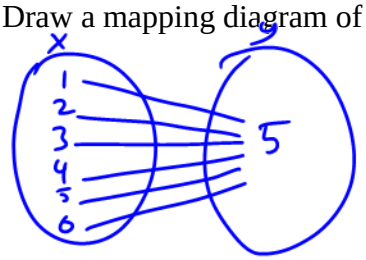


{(2,1),(2,2),(5,3),(8,7),(11,5),(14,4),(14,7)}

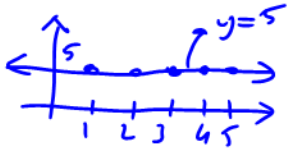
Domain = {2, 5, 8, 11, 14}
Range = {1,2,3,4,5,6,7}

This is not a function because there're repeating "x" values such as 2 and 14

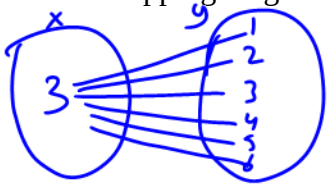
4. Draw a mapping diagram of $y = 5$ with a domain of $D = \{1,2,3,4,5,6\}$. Is this a function?



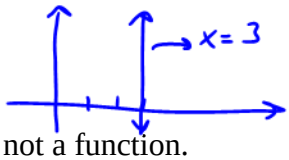
It's a function because each "x" value matches with only one "y" value



5. Draw a mapping diagram of $x = 3$ with a range of $R = \{1,2,3,4,5,6\}$. Is this a function?

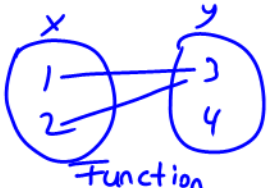


It's not a function because "x" value matches with more than one "y" value.

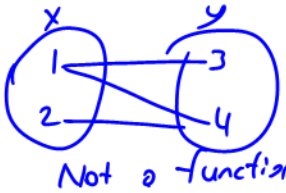


Doesn't pass VLT either.

6. Make an example of a mapping diagram of a function, and one that is not a function.



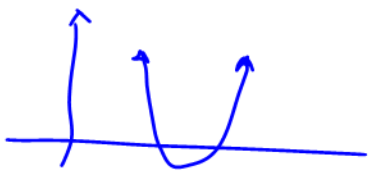
Function



Not a function b/c 1 matches with two "y"s

7. Draw an example of a graph that is a function and one that is not a function.

Function



Not a function