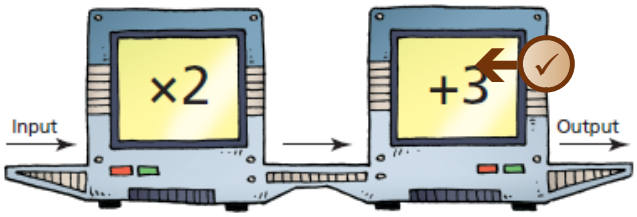
5.2 Properties of Functions

LESSON FOCUS Develop the concept of a function.

Make Connections



Input	Output
1	5
2	7
3	9
4	11
5	13

What is the rule for the Input/Output machine above?

Which numbers would complete this table for the machine?

Remember

Independent / Dependent

Dependent - a variable whose value is determined by the value of another(independent) variable.

Independent - a variable whose value is not determined by the value of another variable, and whose value determines the value of another (dependent) variable

Complete the chart for y = -2x+5

$y = -2(x) + 5$

Independent dependent

x	y
0	5
1	3
2	1
3	-1

down 2

$x=0$: $-2(0)+5$, $0+5$, 5

$x=1$: $-2(1)+5$, $-2+5$, 3

$x=2$: $-2(2)+5$, $-4+5$, 1

Complete the chart for y = $\frac{18x}{6}$

hint: x should count by 6

x	y
0	0
6	18
12	36

$x=0$: $\frac{18(0)}{6} = \frac{0}{6} = 0$

$x=6$: $\frac{18(6)}{6} = 18$

$x=12$: $\frac{18(12)}{6} = 32$

Same as y = 3x

Write an equation for the chart

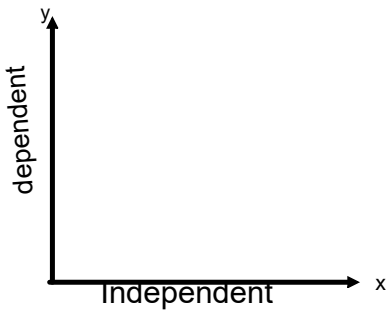
Independent Variable

- Hours do not depend on the person's pay.

Dependent Variable

- A person's pay often depends on the number of hours worked.

Hours Worked, h	Gross Pay, P ($)
1	12
2	24
3	36
4	48
5	60



When graphing always

Try This!!

Number of Marbles, n	Mass of Marbles, m (g)
1	1.27
2	2.54
3	3.81
4	5.08
5	6.35
6	7.62

a) State the domain & Range.
b) Is this relation a function?
c) State the dependent and independent variables.
d) Write the function notation.

Solution:

a) Domain: { 1, 2, 3, 4, 5 }
Range: {1.75, 3.50, 5.25, 7.00, 8.75 }

b) Function

c) Independent - number of tickets
Dependent - Cost

d) C(n) = 1.75 n

Recall from last day

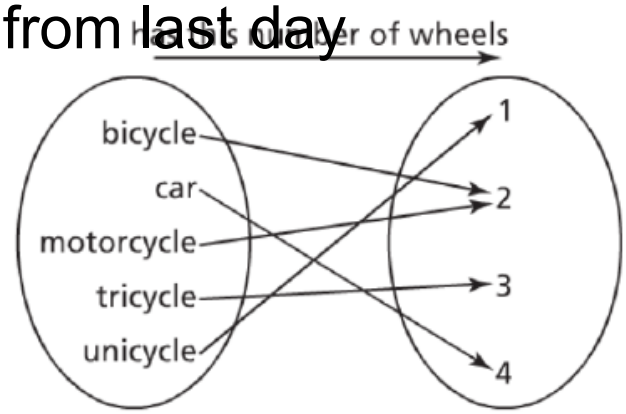
Domain & Range

Domain - the set of first elements in a relation

Range - the set of second elements in a relation

Input	Output
1	5
2	7
	9
4	
	13

Recall from last day

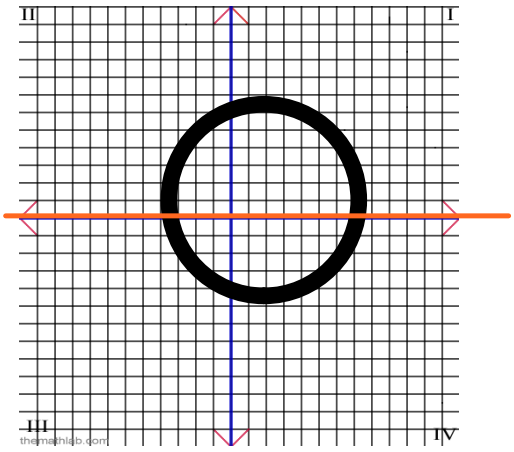


Domain The first set of elements:
{bicycle, car, motorcycle, tricycle, unicycle}

Range The second set of elements:
{1, 2, 3, 4}

Recall from last day

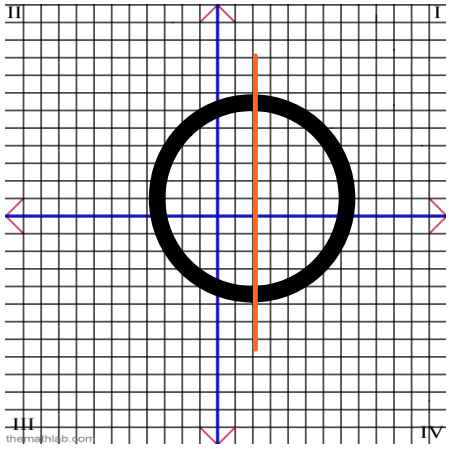
Domain



The **domain** represents all the values of x.

X is the independent Variable

Range



The **range** represents all the values of y.

Y is the dependent Variable

How do you state the range?

$$\{y \mid y \leq 5, y \in R\}$$

such that — Belongs to

$$\{y \mid -5 \leq y \leq 8, y \in I\}$$

MATH 10

FUNCTIONS

1min

Relations VS Functions

In	Out
1	6
2	8
3	10
4	12

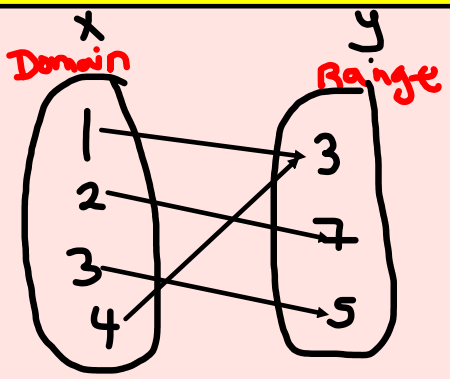
- a relation is where a pattern/relationship exists between the independent variable (x) and the dependent variable(y).

$y = 2x + 4$

- a function is a special relationship where...
  "each x has one and only one y value".

Can't repeat "x"

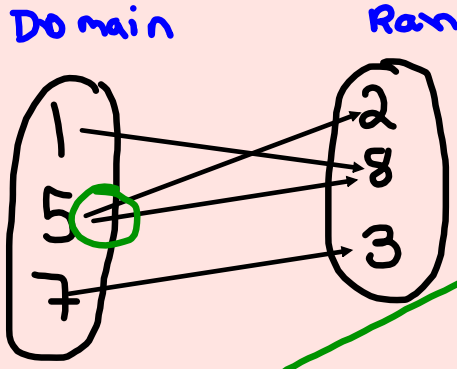
1)



Function
↓
x values are not repeated

$\{(1,3), (2,7), (3,5), (4,3)\}$

2)



Non function

x = 5 Repeated

$\{(1,8), (5,2), (5,8), (7,3)\}$

Function or Nonfunction

Function:
A relation where each element in the first set is associated with one and only one element in the second set.

Function

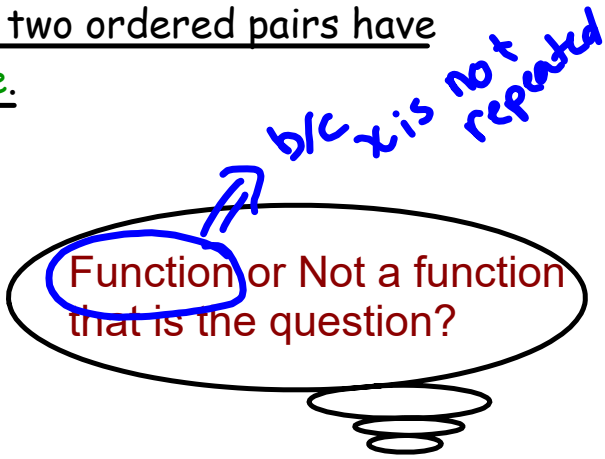
Functions

- How can I tell from a set of points/table?

"an x value has more than one y value"

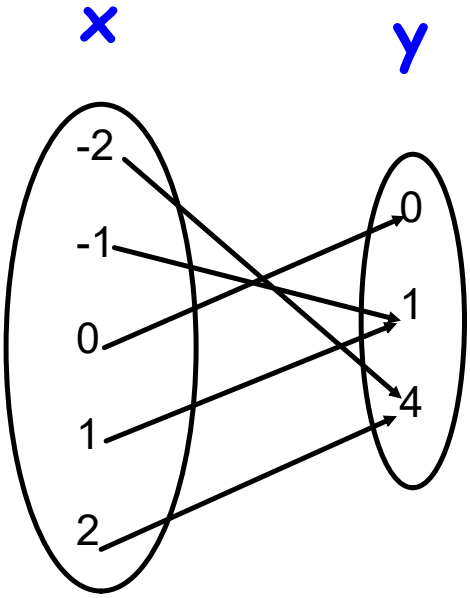
- a function is a relation in which no two ordered pairs have the same first coordinate.

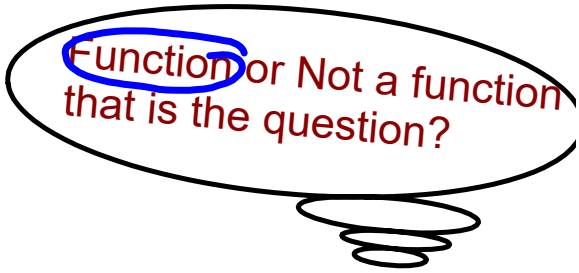
x	y
3	5
7	11
8	15
9	22

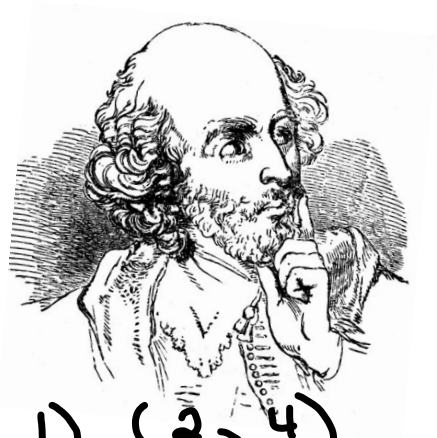


Arrow Diagrams

Function:
For every first element there is one and only one second element. (Only one arrow starts from each element of the domain.)





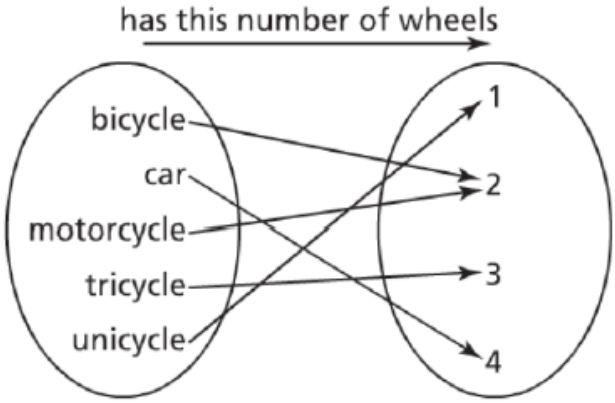


(-2, 4), (-1, 1) (0, 0) (1, 1) (2, 4)

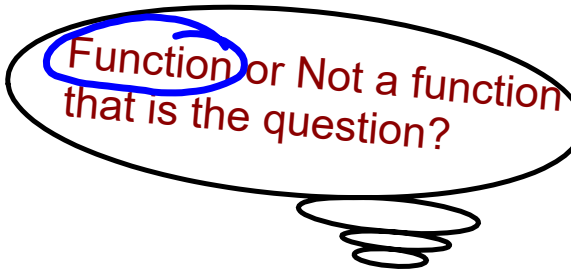
No x values repeated so function.

Sport	Equipment
badminton	shuttlecock
badminton	racquet
hockey	puck
hockey	stick
tennis	ball
tennis	racquet
soccer	ball

Function or Not a function that is the question?



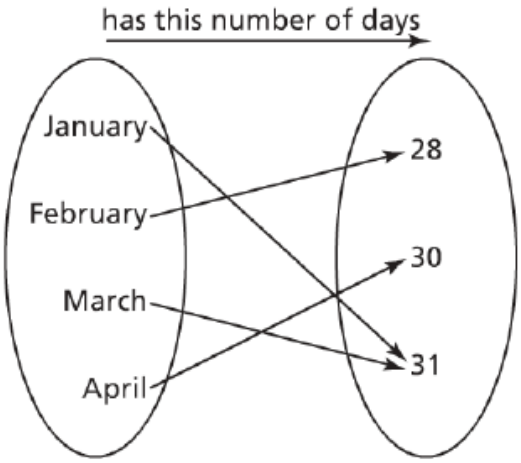
Not Repeated So Function

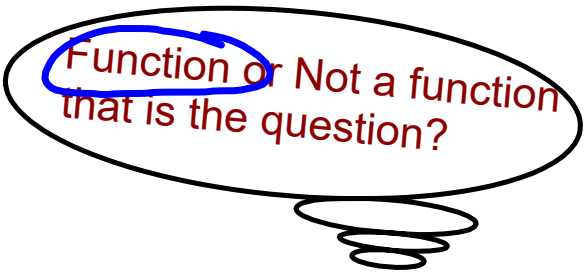


$\{ (2, 5), (3,7) , (4, 2) , (2, 6) , (8,0) \}$

$x = 2$ is Repeated so Non-function

Function or Not a function that is the question?


has this number of days
January
February
March
April
28
30
31

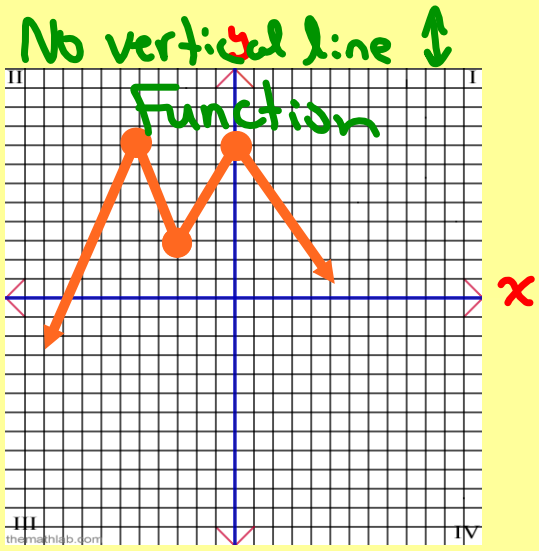

Function or Not a function
that is the question?

Function or Nonfunction

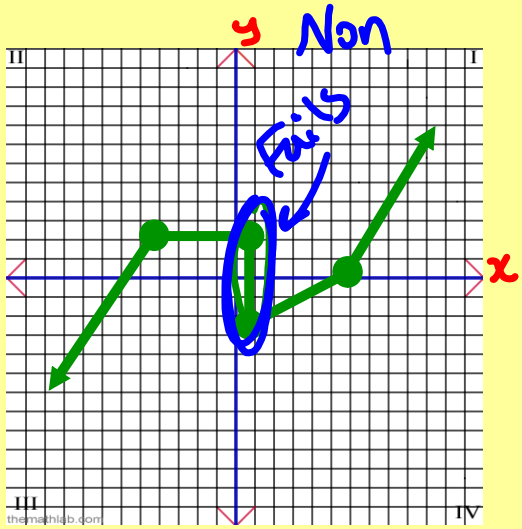
** To determine whether or not a graph is a function or nonfunction, we use what is called the vertical line test!!

** If the line crosses the graph more than once at any particular location, then it is not a function.

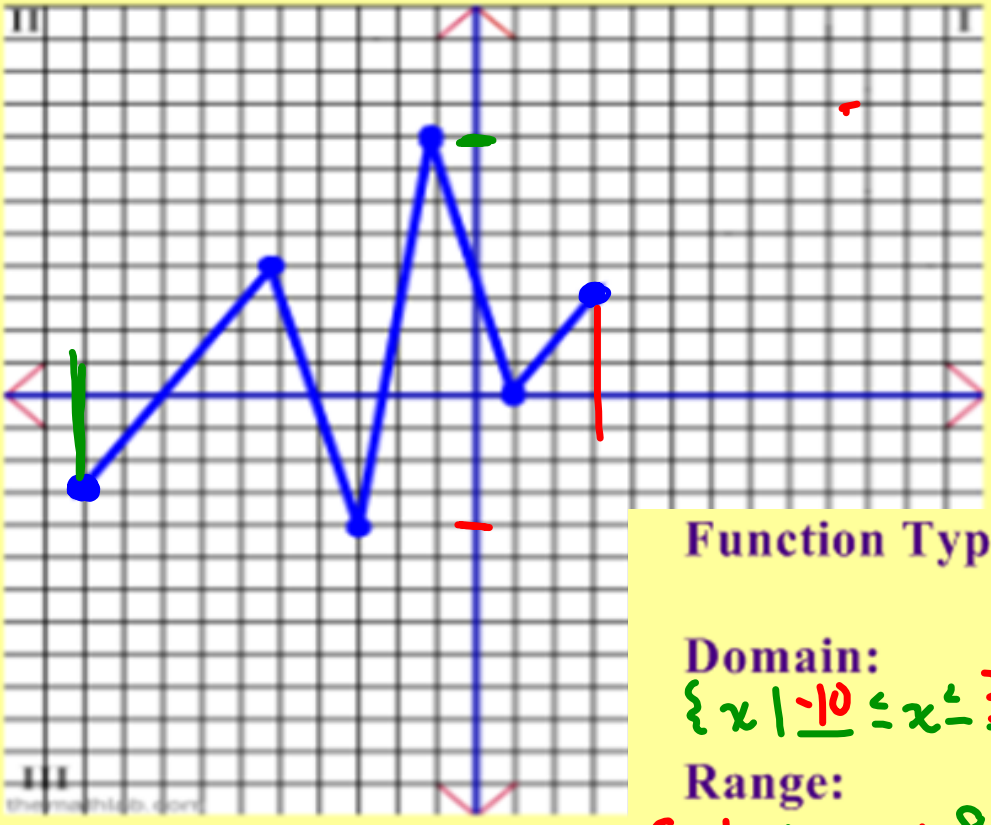
Function



Nonfunction



** State whether the graph is a function or nonfunction, as well as stating the domain & range!!

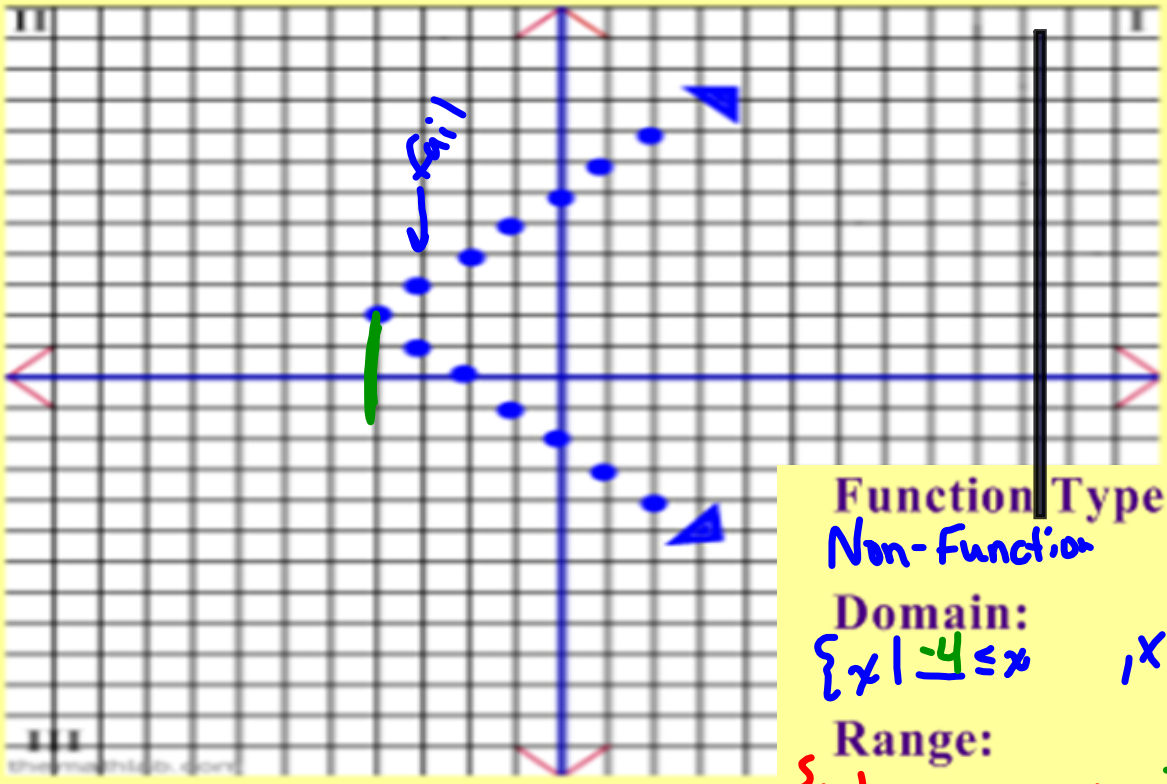


Function Type: Function

Domain:
$\{x \mid -10 \leq x \leq 3, x \in \mathbb{R}\}$

Range:
$\{y \mid -4 \leq y \leq 8, y \in \mathbb{R}\}$

* State whether the graph is a function or nonfunction, as well as stating the domain & range!!



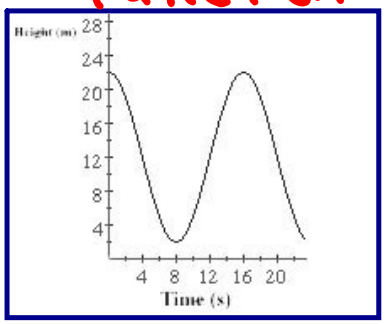
Function Type:
Non-Function

Domain:
$\{x \mid -4 \leq x$, $x \in I\}$

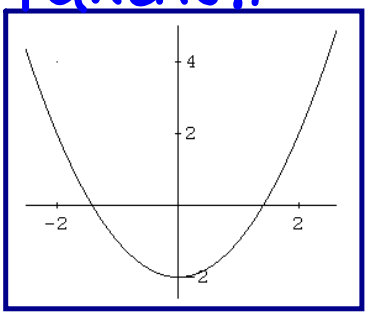
Range:
$\{y \mid$, $y \in I\}$

Use the Vertical Line Test to see if the graph is a function

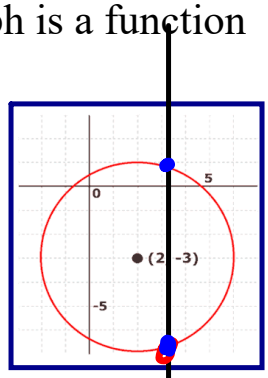
Function



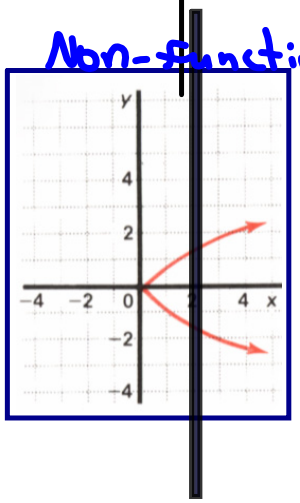
Function



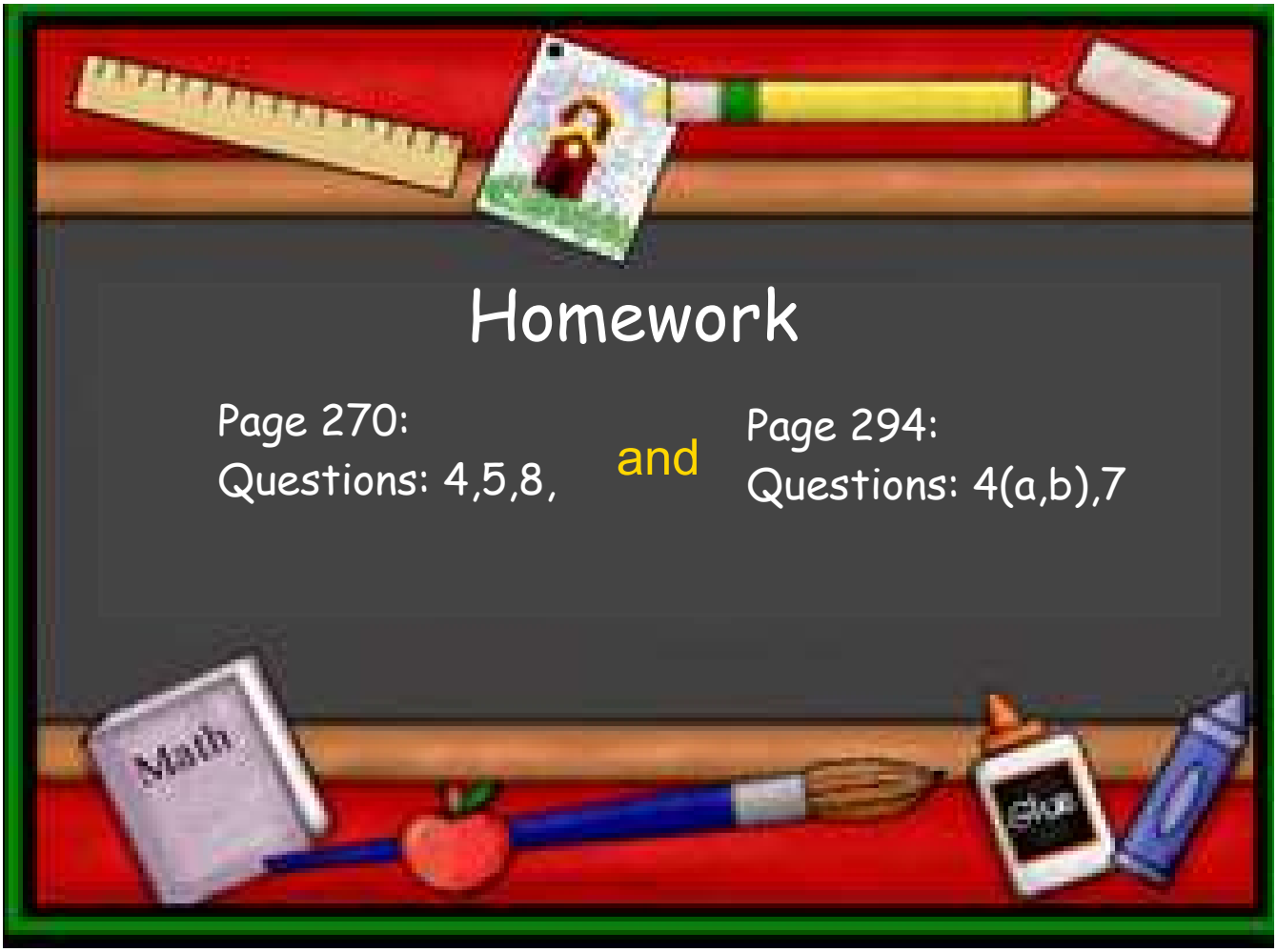
Non-function



Non-function



Graphs are so EASY


Homework
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Questions: 4,5,8,
and
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Questions: 4(a,b),7
Math
glue