Section 8.1 (page 404)
Relations and Functions

Relation: set of ordered pairs

- **Domain:** first coordinates (x-values)
- **Range:** second coordinates (y-values)

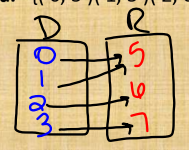
Function: each member of the domain is paired with exactly one member of the range.

(no x-value repeats)

The **Vertical Line Test** is a test to determine if any graph is a function.

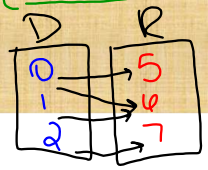
Example 1: Is each relation a function? Explain. (Use a mapping diagram!)

a. {(0, 5)(1, 5)(2, 6)(3, 7)}



yes
each x has one y

b. {(0, 5)(0, 6)(1, 6)(2, 7)}



no
0 → 5
0 → 6

Functions can model many everyday situations when one quantity depends on another. One quantity is then "a function of the other."

Example 2: Is the time needed to mow a lawn a function of the size of the lawn? Explain.

D: size of lawn
R: time to mow

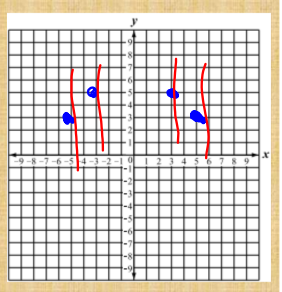
time depends on size

not function → one lawn could take different times

Example 3: Using the Vertical Line Test

a. Graph the relation

Domain (x)	Range (y)
-3	5
-5	3
3	5
5	3

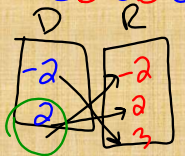


b. Use the vertical-line test to determine if the relation is a function.

yes → each vertical line hits one point

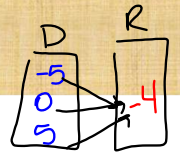
Quick Check 1: Is each relation a function? Explain. (Use a mapping diagram!)

a. {(-2, 3)(2, 2)(2, -2)}



no
2 → 2
2 → -2

b. {(-5, -4)(0, -4)(5, -4)}



yes
each x has one y
(no x-value repeats)

Quick Check 2:

a. For the US Postal Service, is package weight a function of the postage paid to mail the package? Explain.

D: postage paid
R: package weight
NO weight does NOT depend on cost

b. For the US Postal Service, is the cost of postage a function of package weight? Explain.

D: weight
R: cost
• cost depends on weight
• each weight has one cost

YES

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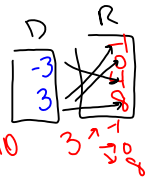
#2 NO each x has more than one y

#4



NO

#8 D: length of cloth
R: price of cloth
• price depends on length
• length will have one price

YES

#10 D: # students
R: # buses
• buses depend on students
• # students could have more than one # buses (different sizes)

NO