Lesson 6.1 Understanding Functions and Relationships Day 1

A system of equations is given.

$7x + 2y = 25$
$2x + 2y = 10$

What are the values of x and y in the solution to the system?

Paradise
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Soaring Above The Rest!

$x=$

$y=$

Simplify Expression

$$\left[\left(\frac{2}{3}\right)^2 \cdot \left(\frac{2}{3}\right)^{-1}\right]^3$$

A ladder 18 feet long is leaning against a wall. The base of the ladder is 9 feet away from the wall. Find the distance from the top of the ladder to the ground.

Wall

18 ft ladder

x ft

9 ft

A system of equations is given.

$7x + 2y = 25$
$2x + 2y = 10$

What are the values of x and y in the solution to the system?

X=3

Y=2

Paradise
Education Center
Soaring Above The Rest!

$x=$

$y=$
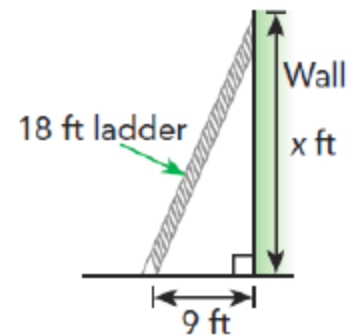
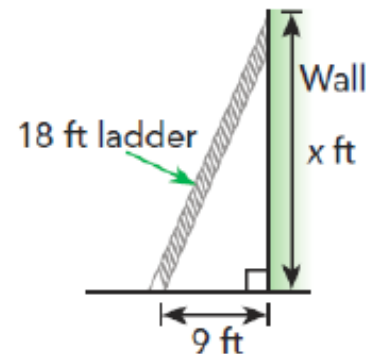## Simplify Expression

$$\left[\left(\frac{2}{3}\right)^2 \cdot \left(\frac{2}{3}\right)^{-1}\right]^3 = \left[\left(\frac{2}{3}\right)^{2-1}\right]^3$$

$$= \left[\left(\frac{2}{3}\right)^1\right]^3$$

$$= \left(\frac{2}{3}\right)^{1\cdot 3}$$

$$= \left(\frac{2}{3}\right)^3$$

A ladder 18 feet long is leaning against a wall. The base of the ladder is 9 feet away from the wall. Find the distance from the top of the ladder to the ground.

15.6

Wall

18 ft ladder

x ft

9 ft

Objective

TSW understand that a function is…

*relation between set of inputs and outputs

> A function is a relation between a set of inputs and a set of outputs, in which every input has exactly one output. You can use tables, graphs, and equations to represent many functions.
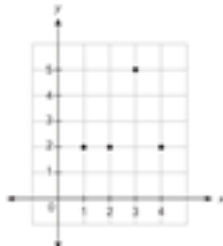
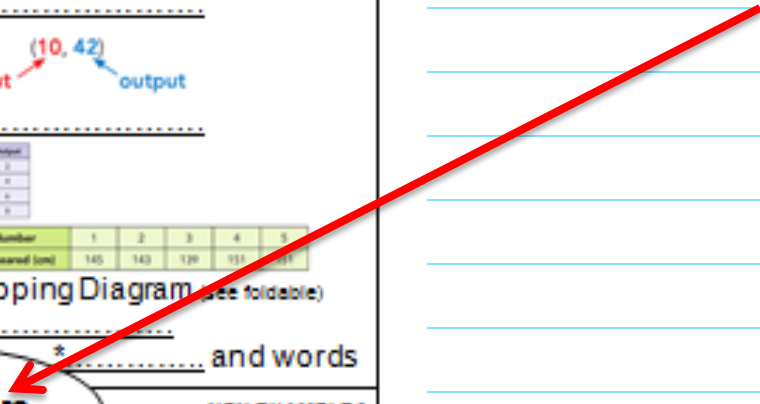**BIG IDEA**

Common Core State Standards

8F1 Understand that a function is a rule that assigns to each input exactly one output. 8F4 Construct a function to model a linear relationship between two quantities 8F5 Describe qualitatively the functional relationship between two quantities by analyzing a graph…

Mathematical Practices *MP1 Solve problems/persevere MP2 Reason MP 4 Model Mathematics*

Lesson 6.1 Understanding Functions and Relationships Day 1

TSW understand that a function is a relation between inputs and outputs.8F1

DEFINITION	CHARACTERISTICS
A relation pairs a set of _____ with a set of _____.	There are multiple ways to represent a relation: * .... (10, 42) input → output * .... [input/output table] [Athlete Number / Height Cleared table: 1 2 3 4 5 / 145 143 139 153 ...] *Mapping Diagram (see foldable) * .... * .... and words

Relation

EXAMPLE S/MODEL S	NON-EXAMPLES
Graphically [graph grid] Write ordered pairs	

DEFINITION

A relation pairs a set of _____ with a set of _____.

DEFINITION

A relation pairs a set of <u>inputs</u> with a set of <u>outputs</u>.

Lesson 6.1 Understanding Functions and Relationships Day 1

CHARACTERISTICS

There are multiple ways to represent a relation:

* ....

(10, 42)

input   output

* ....

Input	Output
1	2
3	4
5	6
7	8

Athlete Number	1	2	3	4	5
Height Cleared (cm)	145	143	139	151	151

*Mapping Diagram (see foldable)

* ....

* .... and words

Lesson 6.1 Understanding Functions and Relationships Day 1

CHARACTERISTICS

There are multiple ways to represent a relation:

*Ordered pairs

(10, 42)

input → output

*Input/Output Table

Input	Output
1	2
3	4
5	6
7	8

Athlete Number	1	2	3	4	5
Height Cleared (cm)	145	143	139	151	151

*Mapping Diagram (see examples)

*Graphically

*Equations and words

Lesson 6.1 Understanding Functions and Relationships Day 1

EXAMPLES/MODELS	Rela

Graphically
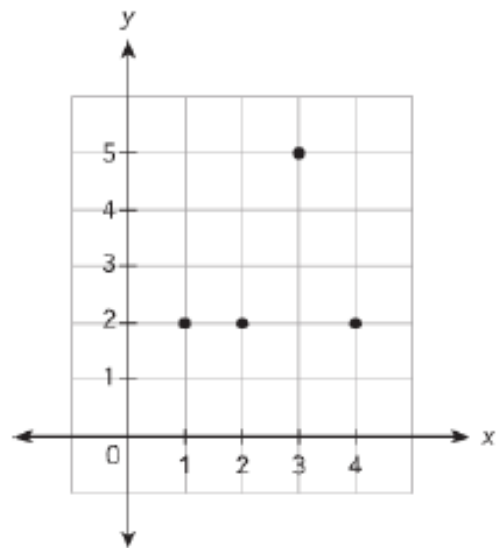
Write ordered pairs

Lesson 6.1 Understanding Functions and Relationships Day 1

EXAMPLES/MODELS	Relat
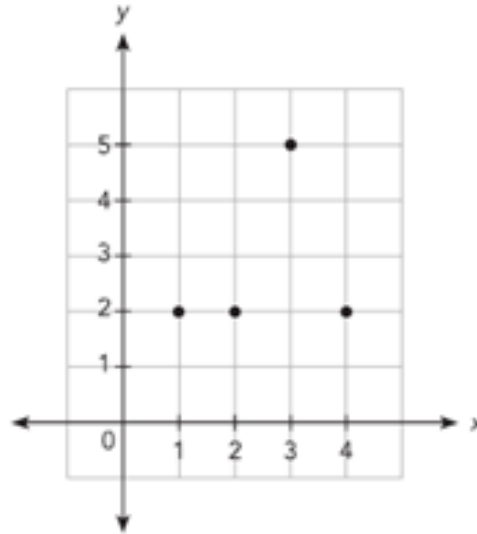
Write ordered pairs
$\{(1,2), (2,2), (3, 5), (4,2)\}$

$y = 4x + 6$

I notice that the equation is written in slope intercept form

Lesson 6.1 Understanding Functions and Relationships Day 1

...tion

NON-EXAMPLES

Lesson 6.1 Understanding Functions and Relationships Day 1

...tion

NON-EXAMPLES

4 constant

7x expression

X variable

CHARACTERISTICS

There are multiple ways to represent a relation:

*Ordered pairs

(10, 42)

input → output

*Input/Output Table

Input	Output
1	2
3	4
5	6
7	8

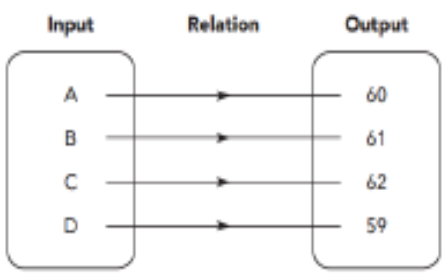| Athlete Number	1	2	3	4	5
Height Cleared (cm)	145	143	139	151	151

*Mapping Diagram (see examples)

*Graphically

*Equations and words

Lesson 6.1 Understanding Functions and Relationships Day 1

One to One Relation Mapping Diagram

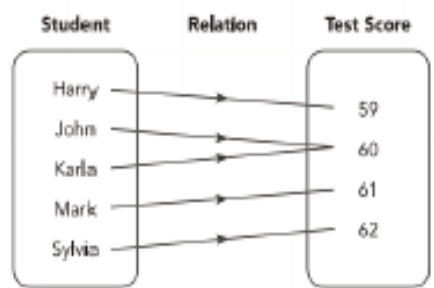| Input	Relation	Output
A	→	60
B	→	61
C	→	62
D	→	59
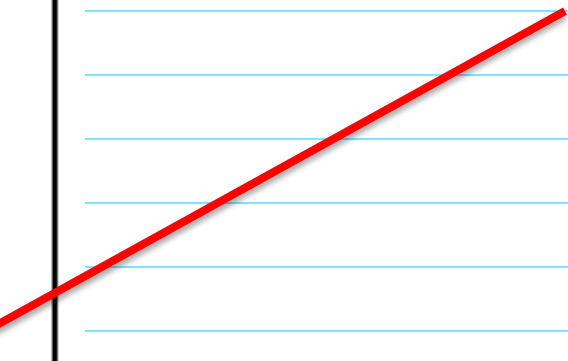
Relation Consists of Ordered Pairs

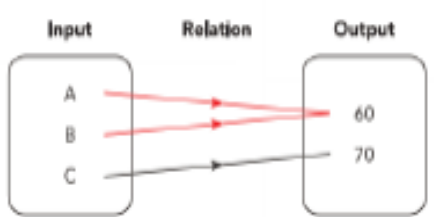{(A,60), (B,61), (C,62), (D,59)}

One to One Relation Real World

Every student has a social security number. Other examples include: School ID and Finger print.
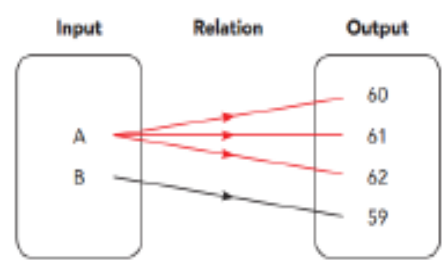
Many to One Relation Real World

Student	Relation	Test Score
Harry		59
John		60
Karla		61
Mark		62
Sylvia		

Many students have can the same test score. Other examples include students with same age.

Many to One Relation

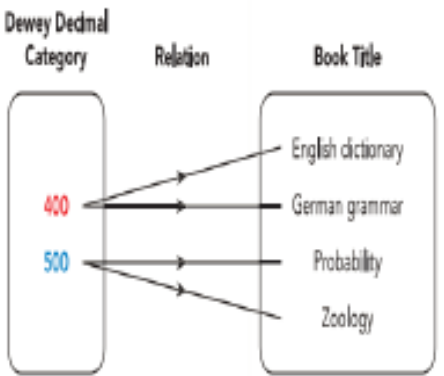| Input	Relation	Output
A		60
B		70
C		

Relation Consists of Ordered Pairs

{(A,60), (B,60), (C,70)}

One to Many Relation Mapping Diagram

Input	Relation	Output
A		60
B		61
		62
		59

Relation Consists of Ordered Pairs

{(A,60), (A, 61), (A, 62), (B, 59)}

One to Many Relation Real World

Dewey Decimal Category — Relation — Book Title

- 400 → English dictionary
- 400 → German grammar
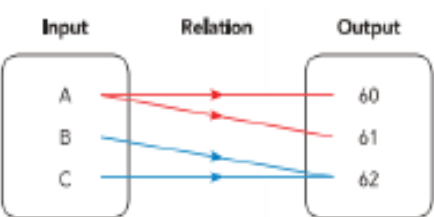- 500 → Probability
- 500 → Zoology

Other examples include: School ID and Finger print. Alphabetize by first name

Many to Many Relation Real World

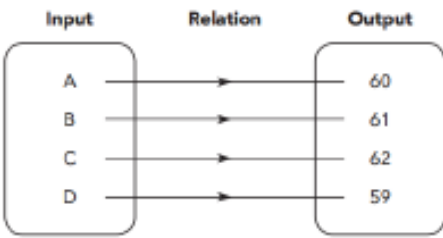Other examples include: Black Friday Shopping– Items relation to Items Sold

Many to Many Relation Mapping Diagram

Input	Relation	Output
A		60
B		61
C		62

Relation Consists of Ordered Pairs

{(A,60), (A, 61), (B, 62), (C, 62)}

Lesson 6.1 Understanding Functions and Relationships Day 1

One to One Relation Mapping Diagram

Input	Relation	Output
A	→	60
B	→	61
C	→	62
D	→	59

Relation Consists of Ordered Pairs

{(A,60), (B,61), (C,62), (D,59)}

One to One Relation Real World

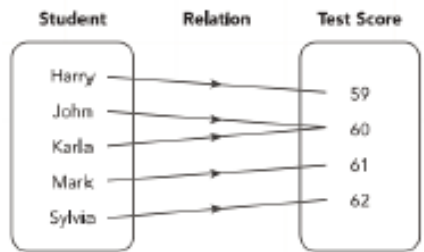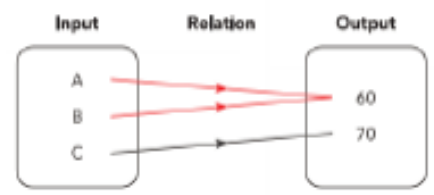| Input	Relation	Output
AA		0
BB		1
CC		2
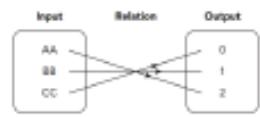
BE SURE TO SHOW ONE TO ONE CROSSING ACROSS EACH OTHER

Every student has a social security number. Other examples include: School ID and Finger print.
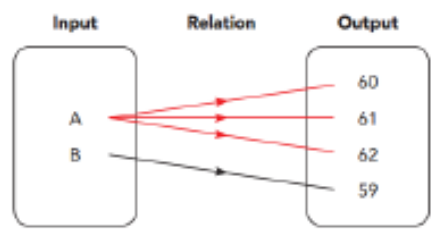
Many to One Relation Real World

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Many students have can the same test score. Other examples include students with same age.
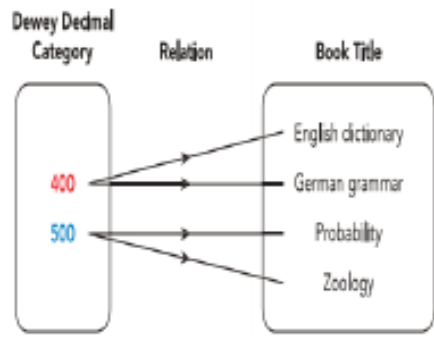
Many to One Relation

Input	Relation	Output
A	→	60
B	→	70
C	→	

Relation Consists of Ordered Pairs

{(A,60), (B,60), (C,70)}

One to Many Relation Mapping Diagram

Input	Relation	Output
A	→	60
	→	61
B	→	62
	→	59

Relation Consists of Ordered Pairs

{(A,60), (A, 61), (A, 62), (B, 59)}

One to Many Relation Real World

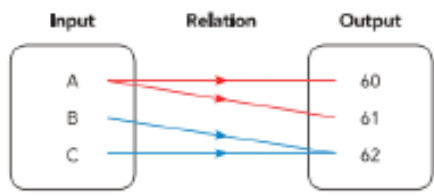| Dewey Decimal Category	Relation	Book Title
		English dictionary
400	→	German grammar
500	→	Probability
		Zoology

Other examples include: School ID and Finger print. Alphabetize by first name

Many to Many Relation Real World

Other examples include: Black Friday Shopping– Items relation to Items Sold
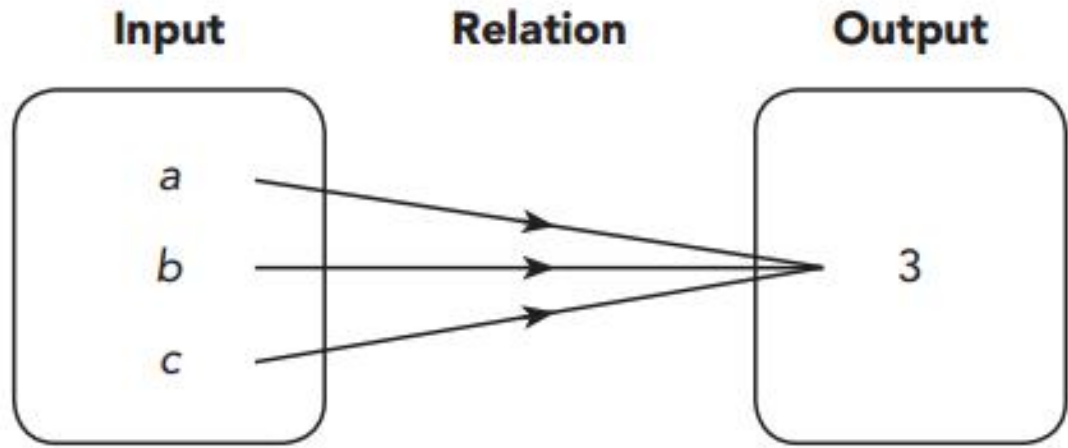
Many to Many Relation Mapping Diagram

Input	Relation	Output
A	→	60
B	→	61
C	→	62

Relation Consists of Ordered Pairs

{(A,60), (A, 61), (B, 62), (C, 62)}

Guided Practice

Complete.

1 Describe the relation between the inputs and the outputs.

Input	Relation	Output

The relation between the inputs and the outputs is a __?__-to-__?__ relation.

1 Describe the relation between the inputs and the outputs.

Input	Relation	Output

| a |
| b | → | 3 |
| c |

The relation between the inputs and the outputs is a __?__-to-__?__ relation. **many; one**

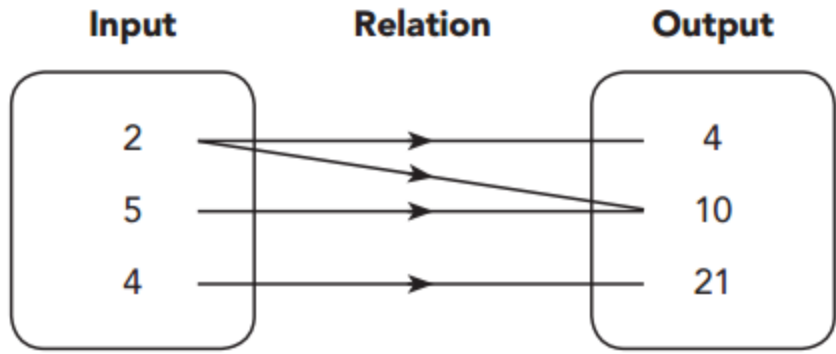**Lesson 6.1 Understanding Functions and Relationships Day 1**

2 Describe the relation between the inputs and the outputs.

Input	Relation	Output
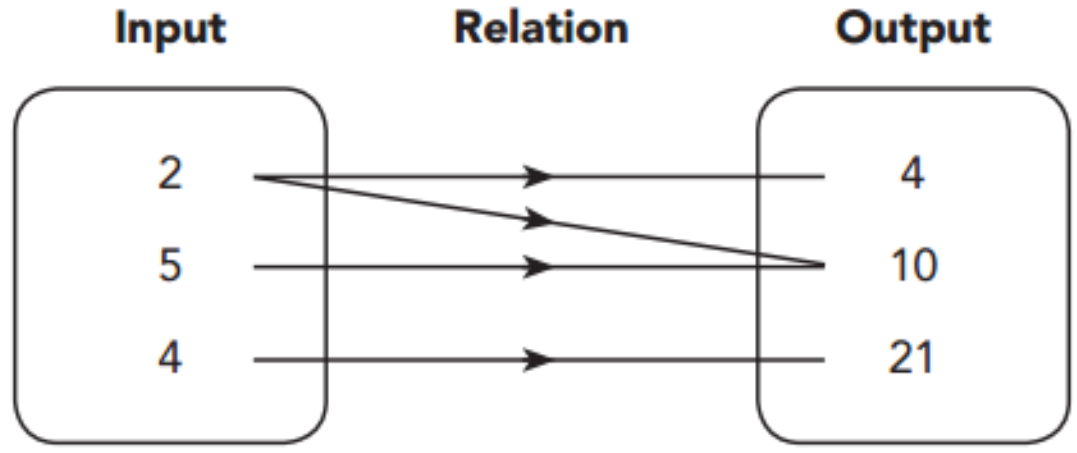
The relation between the inputs and the outputs is a __?__-to-__?__ relation.

Lesson 6.1 Understanding Functions and Relationships Day 1

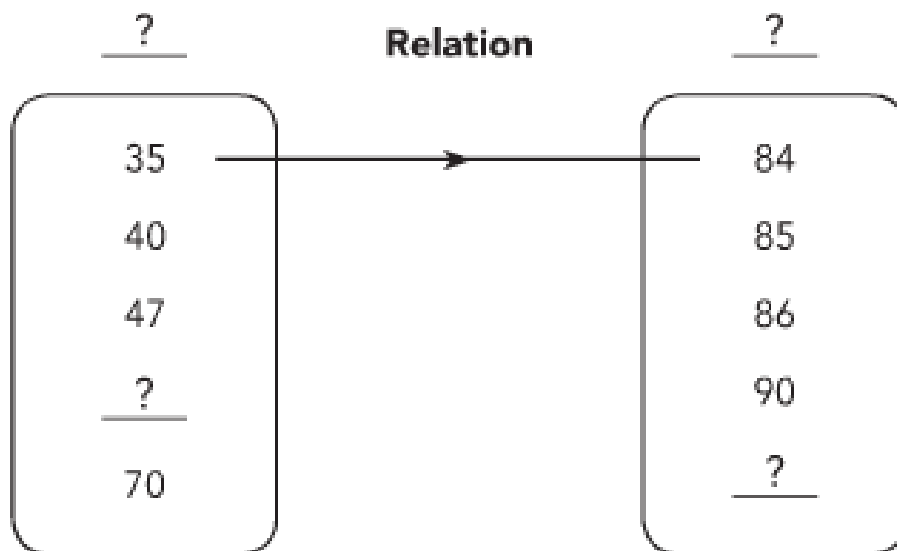**2** Describe the relation between the inputs and the outputs.

Input	Relation	Output
2		4
5		10
4		21

The relation between the inputs and the outputs is a __?__-to-__?__ relation. **many; many**

3 The table shows the relation between the heights of five statues and their weights.

Height (in.)	40	35	56	70	47
Weight (lb)	85	84	90	99	86

Copy and complete the mapping diagram to show the relation between the heights of the five statues and their weights. Then identify the type of relation between the heights and the weights.
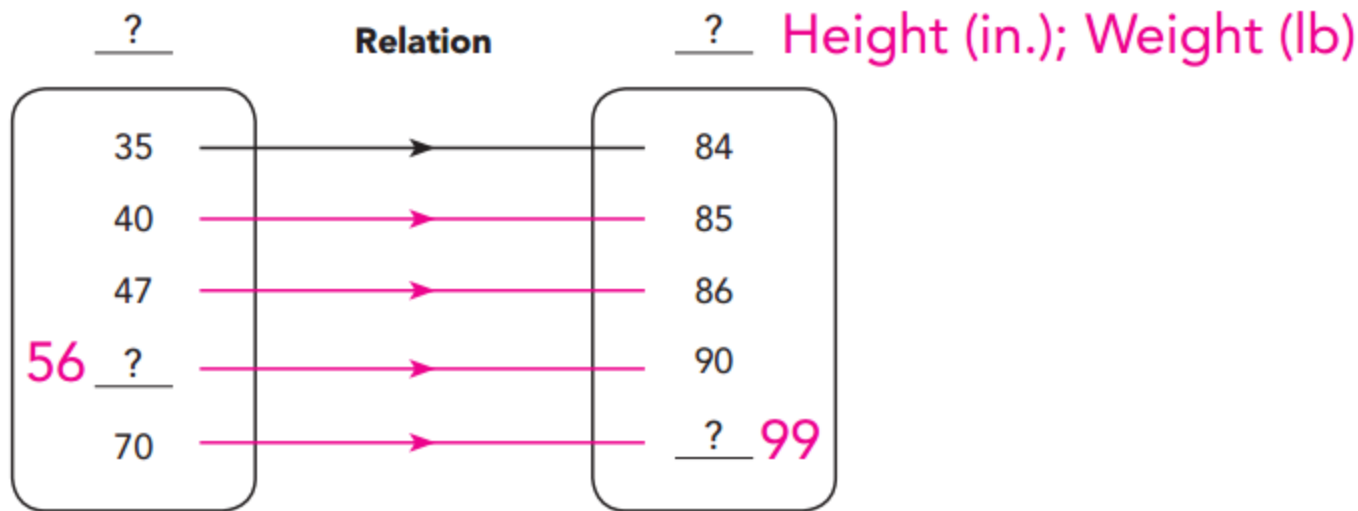

The relation between the heights and the weights is a __?__-to-__?__ relation.

3 The table shows the relation between the heights of five statues and their weights.

Height (in.)	40	35	56	70	47
Weight (lb)	85	84	90	99	86

Copy and complete the mapping diagram to show the relation between the heights of the five statues and their weights. Then identify the type of relation between the heights and the weights.

__?__   **Relation**   __?__ Height (in.); Weight (lb)

35 ⟶ 84
40 ⟶ 85
47 ⟶ 86
56 _?_ ⟶ 90
70 ⟶ _?_ 99

Practice 6.1 #1-8

Challenge-

*Solve created equations

"Pick a Snowflake"

*Real World Problem (website)

*BuzzMath

✓ **Lesson Check #1 & 5–** understand relations and identify types of relations

Ticket Out the Door- Connect, Extend, Challenge

1. How are the ideas and information presented CONNECTED to what you already knew?

2. What new ideas did you get that EXTENDED or pushed your thinking in new directions?

3. What is still CHALLENGING or confusing for you to get your mind around? What questions, wonderings or puzzles do you now have?