

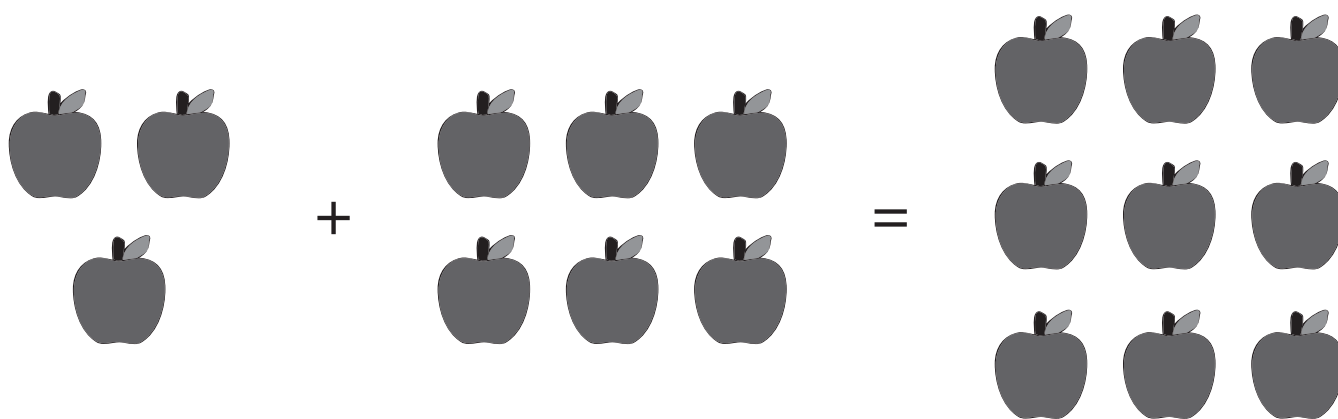
## Display Master: Key Ideas: Multiplicative vs. Additive Thinking

- Additive thinking is present when a constant number is added to a value to get the resulting value.
- Multiplicative thinking is present when a value is multiplied by a constant rate to get the resulting value.

Additive Thinking			Multiplicative Thinking		
○	+ 3	○ ○ ○ ○	○	x 3	○ ○ ○
○ ○	+ 3	○ ○ ○ ○ ○	○ ○	x 3	○ ○ ○ ○ ○ ○
○ ○ ○	+ 3	○ ○ ○ ○ ○ ○	○ ○ ○	x 3	○ ○ ○ ○ ○ ○ ○ ○ ○
○ ○ ○ ○	+ 3	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○	x 3	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○

- A proportional relationship exists when multiplicative thinking is present.

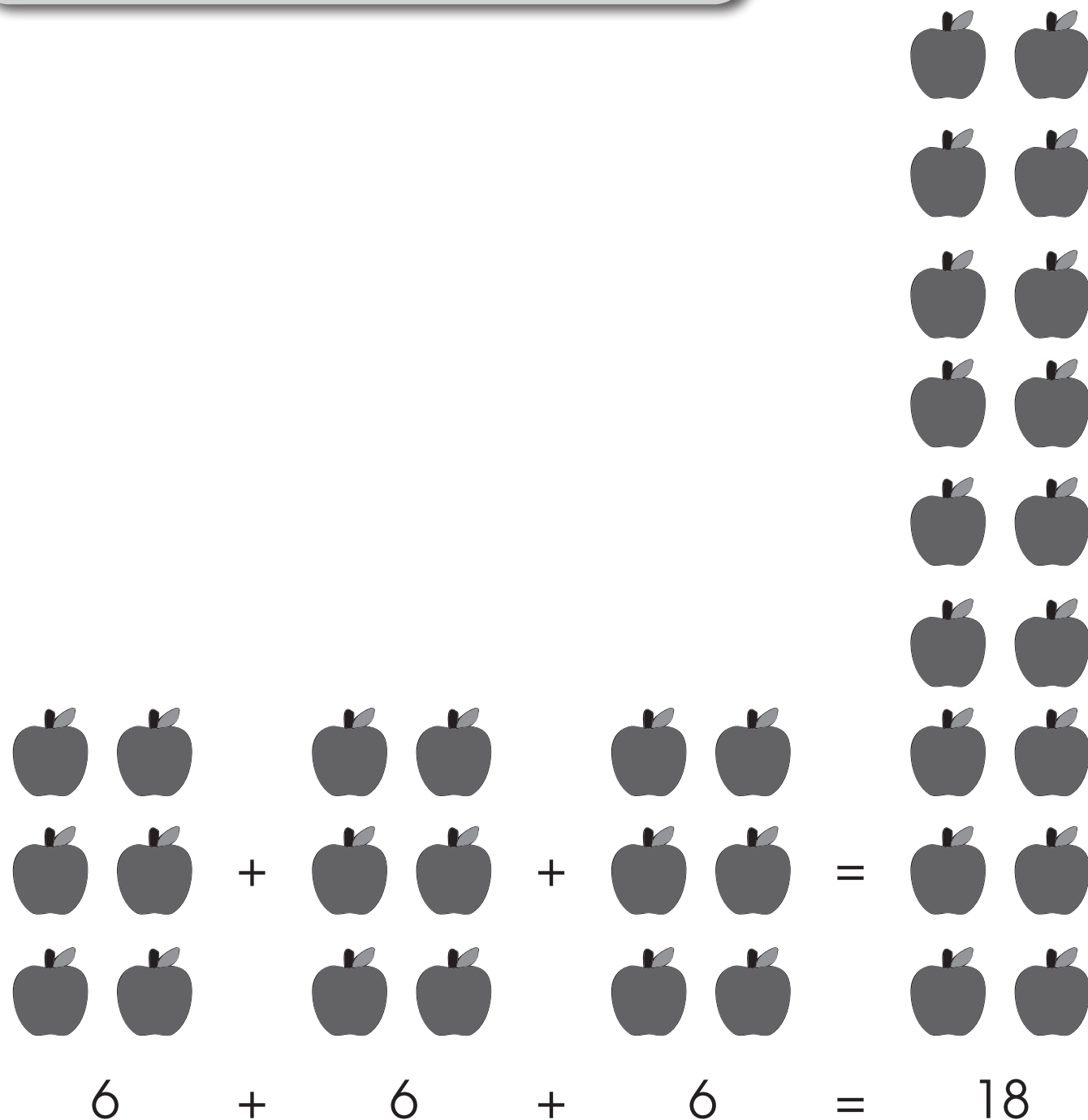
## Display Master: Apple Addition



A visual model for the addition problem 3 + 6 = 9. On the left, there are 3 apples arranged in a triangle (two on top, one on the bottom). In the middle, there is a plus sign. To the right of the plus sign, there are 6 apples arranged in two rows of three. To the right of the 6 apples, there is an equals sign. To the right of the equals sign, there are 9 apples arranged in three rows of three. Below the visual model, the equation is written as 3 + 6 = 9.

$$3 + 6 = 9$$

## Display Master: Apple Multiplication



or

$$3 \times 6 = 18$$

## Display Master: Fruit Punch A

3 cups of orange juice are used for every cup of cranberry juice when making fruit punch.

Cups of cranberry juice $x$	Process		Cups of orange juice $y$
	Add	Multiply	
1			3
2			6
3			
4			
10			
$x$			

## Display Master: Fruit Punch B

3 cups of orange juice are used for every cup of cranberry juice when making fruit punch.

Cups of cranberry juice $x$	Process		Cups of orange juice $y$
	Add	Multiply	
1	$1 + 2$	$3(1)$	3
2	$2 + 4$	$3(2)$	6
3			
4			
10			
$x$			

## Display Master: Fruit Punch C

Cups of cranberry juice $x$	Process: Multiply	Cups of orange juice $y$
1	$3(1)$	3
2	$3(2)$	6
3	$3(3)$	9
4	$3(4)$	12
10	$3(10)$	—
$x$	$3(x)$	—

## Display Master: Fruit Punch D

Cups of cranberry juice $x$	Process: Multiply	Cups of orange juice $y$
1	$3(1)$	3
2	$3(2)$	6
3	$3(3)$	9
4	$3(4)$	12
10	$3(10)$	30
$x$	$3(x)$	$3x$

Therefore,  $y = 3x$

**Display Master: Fruit Punch E**

$$\frac{2}{6} = \frac{3}{9}$$



**Display Master: Fruit Punch F**

$$\frac{2}{6} = \frac{1}{3}$$

$$\frac{3}{9} = \frac{1}{3}$$

Therefore, the ratios are proportional.

## Display Master: How Old? A

James was 4 years old when his sister Lisa was born.

Lisa's age $x$	Process		James' age $y$
	Add	Multiply	
1			5
2			6
3			

## Display Master: How Old? B

James was 4 years old when his sister Lisa was born.

Lisa's age $x$	Process		James' age $y$
	Add	Multiply	
1	$1 + 4$	$5(1)$	5
2	$2 + 4$	$3(2)$	6
3			
12			
$x$			

## Display Master: How Old? C

Lisa's age $x$	Process: Add	James' age $y$
1	$1 + 4$	5
2	$2 + 4$	6
3	$3 + 4$	7
12	$12 + 4$	—
$x$	$x + 4$	—

## Display Master: How Old? D

Lisa's age $x$	Process: Add	James' age $y$
1	$1 + 4$	5
2	$2 + 4$	6
3	$3 + 4$	7
12	$12 + 4$	16
$x$	$x + 4$	$x + 4$

Therefore,  $y = x + 4$

**Display Master: How Old? E**

$$\frac{1}{5}$$

$$\frac{2}{6}$$

**Display Master: How Old? F**

$$\frac{1}{5} = \frac{1}{5}$$

$$\frac{2}{6} = \frac{1}{3}$$

Therefore, the ratios are not proportional.

**Display Master: Grapes and Apples A**

Julie is making a fruit salad. The recipe asks for 4 apples for every 1 bunch of grapes.



## Display Master: Grapes and Apples B

Bunches of grapes $x$	Process		Number of apples $y$
	Add	Multiply	
1			4
2			
3			
4			
$x$			

## Display Master: Grapes and Apples C

Bunches of grapes $x$	Process		Number of apples $y$
	Add	Multiply	
1	$1 + 3$	$4(1)$	4
2	$2 + 6$	$4(2)$	8
3			
4			
$x$			

## Display Master: Grapes and Apples D

Bunches of grapes $x$	Process	Number of apples $y$
1	$4(1)$	4
2	$4(2)$	8
3	$4(3)$	12
4	$4(4)$	16
$x$	$4(x)$	

## Display Master: Grapes and Apples E

Bunches of grapes $x$	Process	Number of apples $y$
1	$4(1)$	4
2	$4(2)$	8
3	$4(3)$	12
4	$4(4)$	16
$x$	$4(x)$	$4x$

Therefore,  $y = 4x$