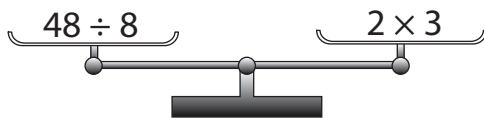


# Understanding Equality

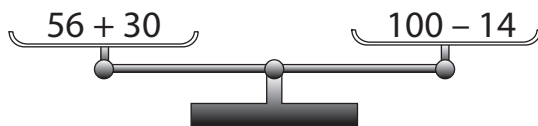


## Quick Review

- Each of these scales is balanced.  
The expression in one pan is equal to the expression in the other pan.



$48 \div 8 = 6$  and  
 $2 \times 3 = 6$   
 So,  $48 \div 8 = 2 \times 3$



$56 + 30 = 86$  and  
 $100 - 14 = 86$   
 So,  $56 + 30 = 100 - 14$

- When we add 2 numbers, their order does not affect the sum.  
This is called the **commutative property of addition**.  
 $7 + 5 = 5 + 7$   
 $a + b = b + a$
- When we multiply 2 numbers, their order does not affect the product.  
This is called the **commutative property of multiplication**.  
 $6 \times 3 = 3 \times 6$   
 $a \times b = b \times a$

## Try These

1. Rewrite each expression using a commutative property.

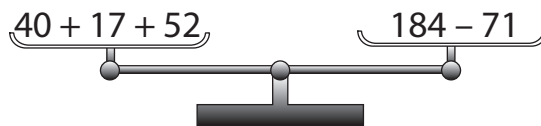
a)  $9 + 6$  \_\_\_\_\_

b)  $7 \times 4$  \_\_\_\_\_

c)  $751 + 242$  \_\_\_\_\_

d)  $27 \times 8$  \_\_\_\_\_

2. Are these scales balanced?  
How do you know?



\_\_\_\_\_

\_\_\_\_\_

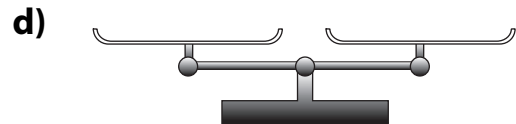
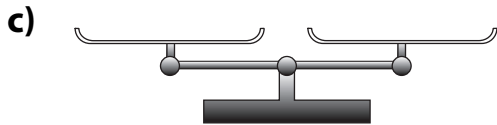
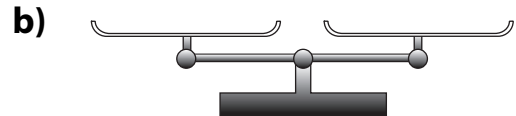
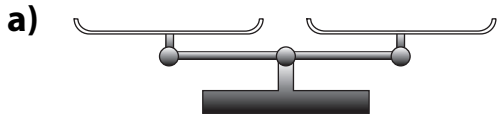
## Practice

1. Work with a partner.

Write an expression in one pan of a balance scale.

Your partner writes a different expression to balance the scale.

Continue with each balance scale. Switch roles at each turn.



2. Draw a line to join pairs of expressions that balance.

a)

Expressions	
$8 \times 9$	$2 \times 53$
$522 \div 9$	$24 + 76$
$75 + 31$	$314 - 242$
$10 \times 10$	$29 \times 2$

b)

Expressions	
$764 - 320$	$4000 - 48$
$76 \times 52$	$18 \div 3$
$36 \div 6$	$5 \times 25$
$52 + 73$	$4 \times 111$

## Stretch Your Thinking

Write 3 equal expressions for each expression below.

a)  $57 + 46 - 31$

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b)  $45 \times 2 + 17$

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c)  $425 \div 5 + 36$

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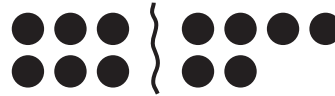
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# Keeping Equations Balanced



## Quick Review

- We can model this equation with counters:  $3 + 3 = 4 + 2$

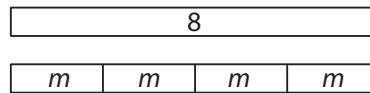


Multiply each side by 2.  
 $6 \times 2 = 6 \times 2$



When each side of an equation is changed in the same way, the values remain equal. This is called the **preservation of equality**.

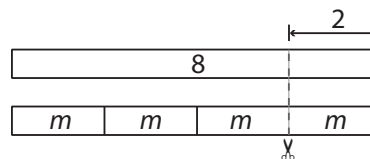
- Suppose we know  $8 = 4m$ . We can model this equation with paper strips.



To preserve the equality, we can subtract the same number from each side.

$$8 - 2 = 4m - 2$$

So,  $8 - 2 = 4m - 2$  is an **equivalent form** of  $8 = 4m$ .

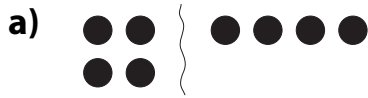


## Try These

1. Model each equation with counters.  
 Use counters to model the preservation of equality. Record your work.
  - a)  $3 + 2 = 1 + 4$
  - b)  $18 \div 3 = 3 \times 2$

## Practice

1. Use addition to preserve the equality of each equation.



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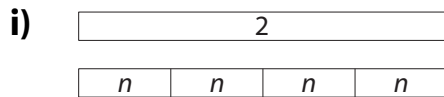
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2. Use subtraction to preserve the equality of each equation in question 1.

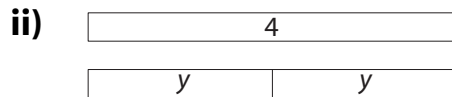
a) \_\_\_\_\_

b) \_\_\_\_\_

3. a) Write an equation for each diagram.



\_\_\_\_\_



\_\_\_\_\_

b) Use multiplication to preserve the equality of each equation.  
Record your work.

i) \_\_\_\_\_

ii) \_\_\_\_\_

## Stretch Your Thinking

Apply the preservation of equality. Write an equivalent form of the equation.  
Use a different operation for each part.

a)  $5y = 20$

\_\_\_\_\_

b)  $20 \div 5 = 8 - 4$

\_\_\_\_\_

c)  $8 \times 6 = 12 \times 4$

\_\_\_\_\_

d)  $5 + 19 = 6s$

\_\_\_\_\_