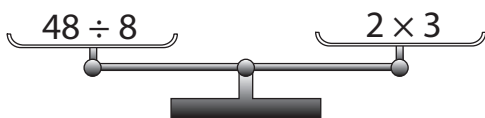


Understanding Equality



Quick Review

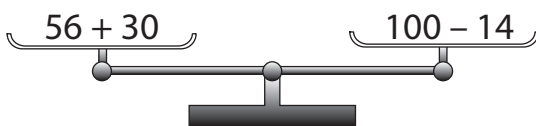
- ▶ Each of these scales is balanced.
The expression in one pan is equal to the expression in the other pan.



$$48 \div 8 = 6 \text{ and}$$

$$2 \times 3 = 6$$

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



$$56 + 30 = 86 \text{ and}$$

$$100 - 14 = 86$$

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.

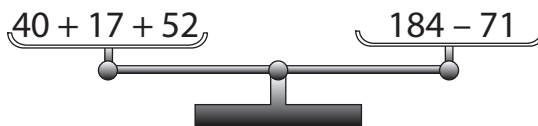
a) $9 + 6$ _____

b) 7×4 _____

c) $751 + 242$ _____

d) 27×8 _____

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



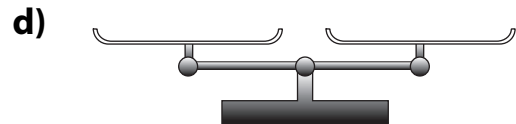
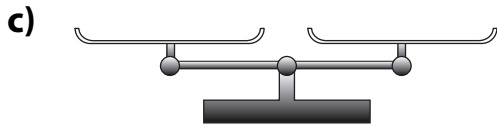
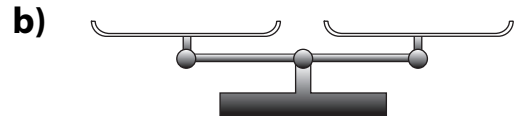
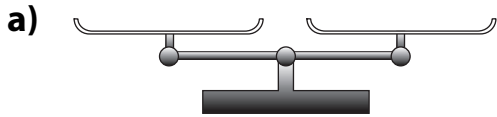
Practice

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

b)

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

Stretch Your Thinking

Write 3 equal expressions for each expression below.

a) $57 + 46 - 31$

b) $45 \times 2 + 17$

c) $425 \div 5 + 36$

Keeping Equations Balanced



Quick Review

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

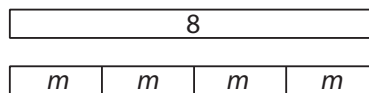


Multiply each side by 2.
 $6 \times 2 = 6 \times 2$



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

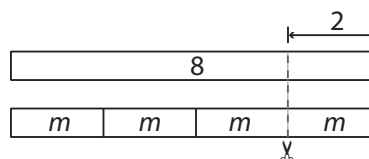
- Suppose we know $8 = 4m$. We can model this equation with paper strips.



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 $8 = 4m$.

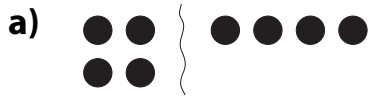


Try These

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.



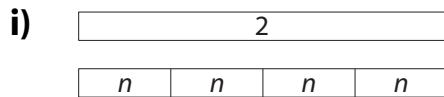


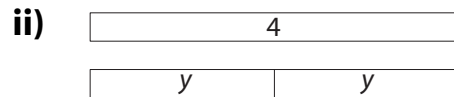
2. Use subtraction to preserve the equality of each equation in question 1.

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) $5 + 19 = 6s$
