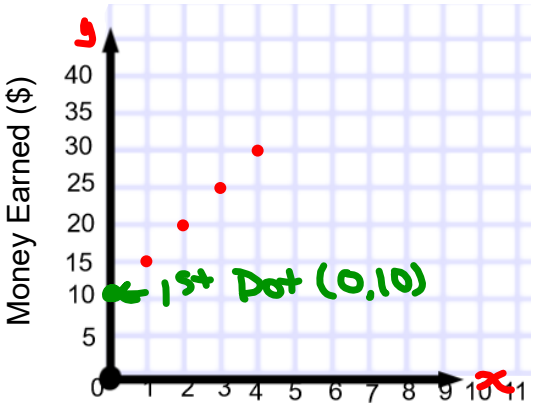
Grade 6 Math

Date: Nov. 2

Sue's Babysitting Earnings



a) Make a table. Record the time and the money earned

b) Find the variable expression for the table.

$5 \times n + 10$

c) Find out how much money will Sue earn for 11 hours.

Time	Money Earned
0	10
1	15
2	20
3	25
4	30

$5 \times n$, $n = 0$ out 10

5×0

0 add 10

$5 \times n + 10$

$5 \times 11 + 10$

$55 + 10$

65

She will earn $65 for working 11 hours.

2) Write another expression that is equivalent to 8 + 22.

$8 + 22$

30

15×2

10×3

$29 + 1$

Homework Solutions

Practice

1. Suppose you were using real balance scales.
Which scales below would balance?
How did you find out?

a) $72 \div 9$ and $13 - 5$ → 8 and 8 → Equal

72÷9 = 8 = 13-5

b) 12×6 and 6×12 → 72 and 72 → Equal

c) $19 - 9$ and $9 + 19$ → 10 and 28 → NOT Equal

2. a) Write an expression with 2 numbers and one operation.
b) Write 5 different expressions that equal your expression in part a.
What strategy did you use to find the expressions?
c) Suppose you used real balance scales.
You put counters to represent 3 of the expressions in the left pan and 3 in the right pan. What would happen? How do you know?

a) 2 + 7

b) 3 x 3, 12-3, 72÷8, 14 - 5, 1 x 9

c) If i put 3 groupd in the left pan and all of them are eqivalent to 9 then the total for the left woild be 3 x 9 = 27.

If I do the same for the right pan. (3 expressions each having a value of 9), then it too would be a total of 27. So the two pans are again equal

order of (+) or (x) does not matter

TIP

3. Rewrite each expression using a commutative property.

a) $5 + 8$ → 8+5
b) 6×9 → 9x6
c) 11×7 → 7x11
d) $12 + 21$ → 21+12
e) $134 + 72$ → 72+134
f) 36×9 → 9 x 36

Show work

4. a) Are these scales balanced?

$36 + 27 - 50$ and 4×3 → NO

Left pan: 36 + 27 -50 → 63 - 50 → 13

Right pan: 4 x 3 → 12

b) If your answer is yes, why do you think so?
If your answer is no, what could you do to balance the scales?
Why would this work?

I would have to remove one from the left pan to make them equal (OR add one to the right pan 4x3 + 1)

5. a) Addition and subtraction are inverse operations.
Addition is commutative. Is subtraction commutative?
Use an example to show your answer.

7-6 = 1 BUT

6 - 7 = -1

NOT the same so subtraction is NOT commutative

b) Multiplication and division are inverse operations.
Multiplication is commutative. Is division commutative?
Use an example to show your answer.

30 ÷ 6 = 5

BUT

6 ÷ 30 = 0.2

NOT the same so division is NOT commutative

Ch. 1 Lesson 8 Keeping Equations Balanced

Let's model with counters

Step 1)

2 groups of 4

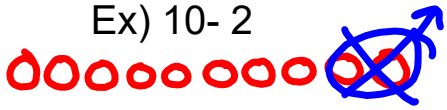
this is

2 x 4

Step 2)

Model another expression that is equivalent to 2 x 4

Ex) 10- 2



This is an equation (has an equal sign)

$$2 \times 4 = 10 - 2$$

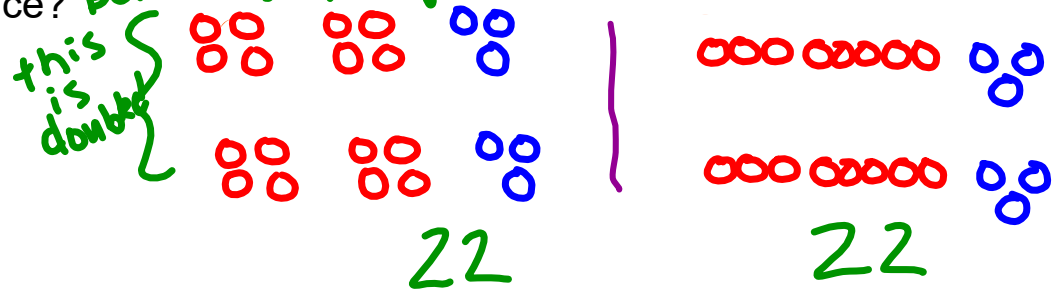
Step 3) Add 3 counter to each side. What do you notice?

Remode Counters

Step 4) Double the amount of counters on each side. What do you notice?

multiply by 2

Both sides are equal



What should we notice?

Both sides are equal

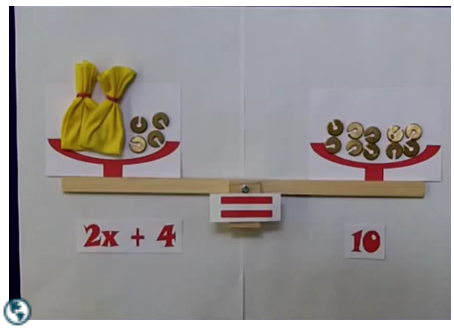
Whatever we do to one side, we did to the other side of the equation too. Each time, the number of counters on both sides remained equal. So the equation remained balanced.

Preservation of equality is when each side of the equation is changed in the same way.

In other words

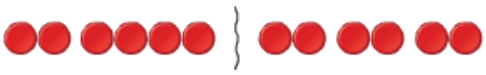
"What you do to one side, you must do to the other."

This is also true for equations with variables.

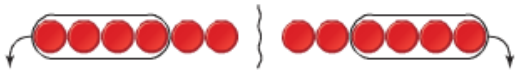


Connect

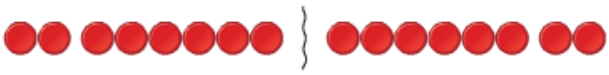
➤ Max started with this equation each time:
$2 + 4 = 3 \times 2$
He modelled it using counters.
Each side has 6 counters.



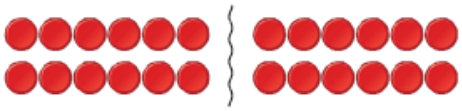
First, Max subtracted 4 from each side.
$6 - 4 = 6 - 4$
Each side now has 2 counters.



Second, Max added 2 to each side.
$6 + 2 = 6 + 2$
Each side now has 8 counters.



Third, Max multiplied each side by 2.
$6 \times 2 = 6 \times 2$
Each side now has 12 counters.



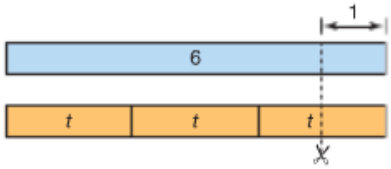
Fourth, Max divided each side into 2 equal groups.
$6 \div 2 = 6 \div 2$
Each group has 3 counters.

➤ Suppose we know $6 = 3t$.
We can model this equation with paper strips.

To preserve the equality, we can:

- Add the same number to each side.
  So, $6 + 1 = 3t + 1$

- Subtract the same number from each side.
  So, $6 - 1 = 3t - 1$

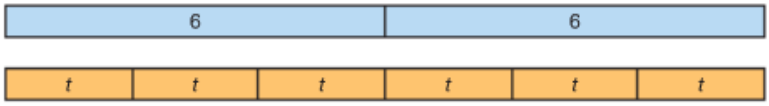


$$2p = 20$$

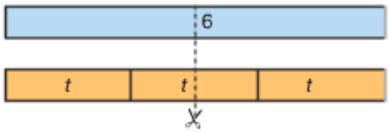
$$2p + 10 = 20 + 10$$

$$2p \times 4 = 20 \times 4$$

- Multiply each side by the same number.
  So, $2 \times 6 = 2 \times 3t$



- Divide each side by the same number.
  So, $6 \div 2 = 3t \div 2$



When we do the same to each side of an equation, we produce an **equivalent form of the equation**.

So, $6 + 1 = 3t + 1$
$6 - 1 = 3t - 1$
$2 \times 6 = 2 \times 3t$
$6 \div 2 = 3t \div 2$
} are all equivalent forms of the equation $6 = 3t$.

Example)

Apply the preservation of equality and write equivalent forms of the equations (NO PAPER STRIPES)

$4f = 24$

Give 3 possible solutions

With addition

$4f = 24$

$4f + 21 = 24 + 21$

With subtraction

$4f = 24$

$4f - 21 = 24 - 21$

With multiplication

$21 \times 4f = 24 \times 21$

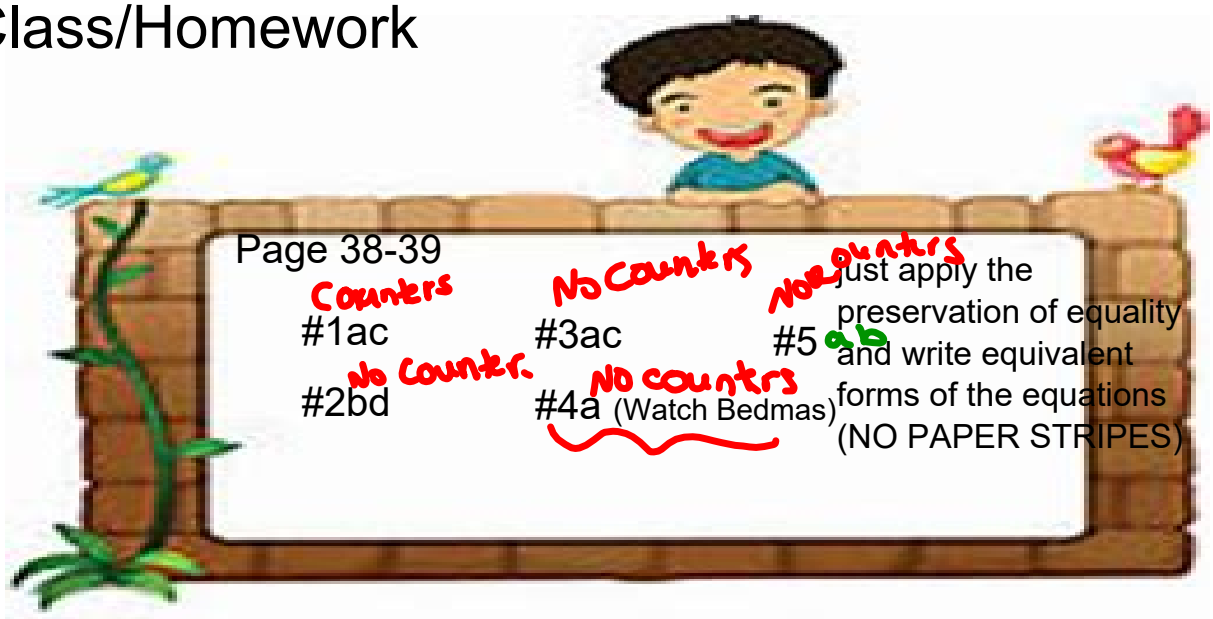
You try

With division

$4f = 24$

$4f \div 4 = 24 \div 4$

Class/Homework



Page 38-39

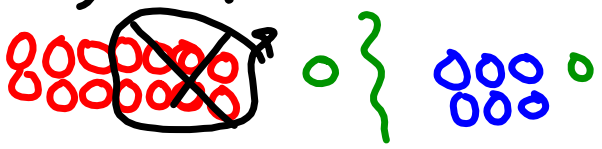
Counters
#1ac
#2bd no counters

No Counters
#3ac
#4a (Watch Bedmas) NO counters

No counters
#5 a b just apply the preservation of equality and write equivalent forms of the equations (NO PAPER STRIPES)

How you show work. Test Tuesday Nov. 6

1b) $14-8=6$



$14-8+1=6+1$

$7 \quad 7$

2a) $7+8=15$

$7+8-1=15-1$

$15-1=14$

$14=$

3b) $2\times(9-6)=(3)\times 2$

Side 1 Side 2

Not $2\times 9-6=3x$

5 a) $5b = 12$

multiplication

$2 \times (5b) = (12) \times 2$

addition

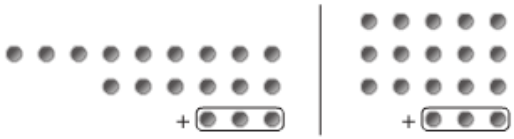
$5b + 1 = 12 + 1$

Practice

1. For each equation below:
   - Model the equation with counters.
   - Use counters to model the preservation of equality for addition.
   - Draw a diagram to record your work.
   - Use symbols to record your work.

   a) $9 + 6 = 15$ b) $14 - 8 = 6$
   c) $2 \times 5 = 10$ d) $15 \div 3 = 9 - 4$

1. a)



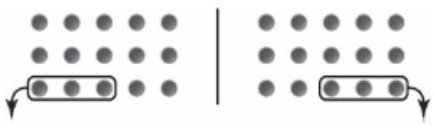
$15 + 3 = 15 + 3$

2. For each equation below:
   - Model the equation with counters.
   - Use counters to model the preservation of equality for subtraction.
   - Draw a diagram to record your work.
   - Use symbols to record your work.

   a) $7 + 8 = 15$ **b)** $12 - 7 = 5$

   c) $3 \times 4 = 12$ **d)** $10 \div 5 = 9 - 7$

2. a)



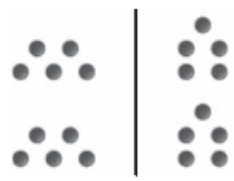
$15 - 3 = 15 - 3$

3. For each equation below:
   - Model the equation with counters.
   - Use counters to model the preservation of equality for multiplication.
   - Draw a diagram to record your work.
   - Use symbols to record your work.

   a) $2 + 3 = 5$ **b)** $9 - 6 = 3$

   c) $2 \times 4 = 8$ **d)** $12 \div 4 = 2 + 1$

3. a)



$5 \times 2 = 5 \times 2$

4. For each equation below:
   - Model the equation with counters.
   - Use counters to model the preservation of equality for division.
   - Draw a diagram to record your work.
   - Use symbols to record your work.

   a) $5 + 1 = 6$ **b)** $8 - 4 = 4$

   c) $5 \times 2 = 10$ **d)** $16 \div 2 = 2 \times 4$

5. For each equation below:
   - Apply the preservation of equality.
     Write an equivalent form of the equation.
   - Use paper strips to check that equality has been preserved.

   Try to use a different operation for each part.

   a) $3b = 12$ **b)** $2t = 8$

   c) $16 = 4s$ **d)** $15 = 5s$

   How do you know that equality has been preserved each time?