Lesson 14. Classwork

WARM-UP

1. Compare using >, <, or =:

a ☐ $a + c$	$a + b$ ☐ $b + a$	$38 - b$ ☐ $68 - b$
b ☐ $b - 5$	$k + 26$ ☐ $62 + k$	$a - 0$ ☐ $a + 0$
4 ☐ $d - d$	$54 + n$ ☐ $54 - n$	$c - 19$ ☐ $c - 90$

2. Solve the first row of problems. Using the answers and a mental math, solve the 2nd and 3rd rows.

$328 + 70 - 95 =$ _____	$200 - 78 - 86 =$ _____	$689 - 314 + 180 =$ _____
$328 + 72 - 95 =$ _____	$200 - 69 - 86 =$ _____	$690 - 314 + 179 =$ _____
$328 + 73 - 96 =$ _____	$300 - 69 - 86 =$ _____	$690 - 313 + 179 =$ _____

3. Calculate the sum using commutative and associative properties of addition:

$13 + 16 + 19 + 22 + 25 + 28 + 31 + 34 + 37 =$

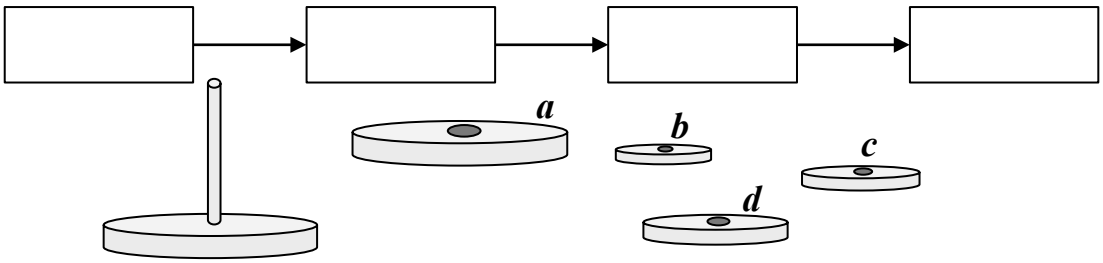
$=$ _____ $=$ _____

NEW MATERIAL

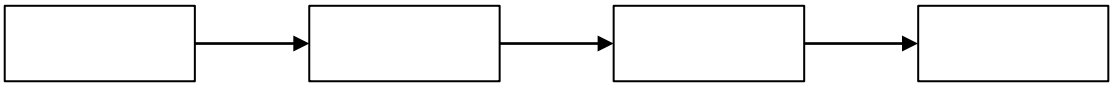
An algorithm is a set of instructions designed to perform a specific task. This can be a simple process, such as multiplying two numbers, or a complex operation, such as playing a compressed video file.

Examples: Any kind of instructions from how to build paper airplanes to how to plant flowers, from rules on how to add numbers to programming. The internet, your Wi-Fi, smartphone, phone, computer, router, satellites, almost everything that has a computer inside uses these algorithms in one way or another to function.

4. Write an algorithm for putting the toy together so the size of the pieces gets smaller towards the top.



Write the algorithm for taking the toy apart.



5. The following list represents the steps needed in order to post a letter. Put the list in the right order.

- Put the letter in the mail box _____
- Take a letter, an envelope and a stamp _____
- Stick the stamp _____
- Go outside to a mailbox _____
- Put a letter inside an envelope _____
- Write a letter _____
- Write address on the envelope _____
- Fold a letter _____

Usually the algorithm lists the operations from first to last; after performing the last one, we stop. Such algorithms are called **linear**.

Some algorithms ask that when you reach the last instruction, you go back to the beginning. Such algorithms are called **cycling**.

Example: Algorithm for downhill skiing: every time you get down to the base, you go to a lift to get back up on the mountain. You repeat this cycle until it's time to go home.

6.

Tea making algorithm. Write algorithms for making a cup of tea for one guest (**linear**) and for many guests (**cycling**).

7.

Removing parentheses

Evaluate:

$20 - 4 - 5 =$ _____ $20 - (4 + 5) =$_____

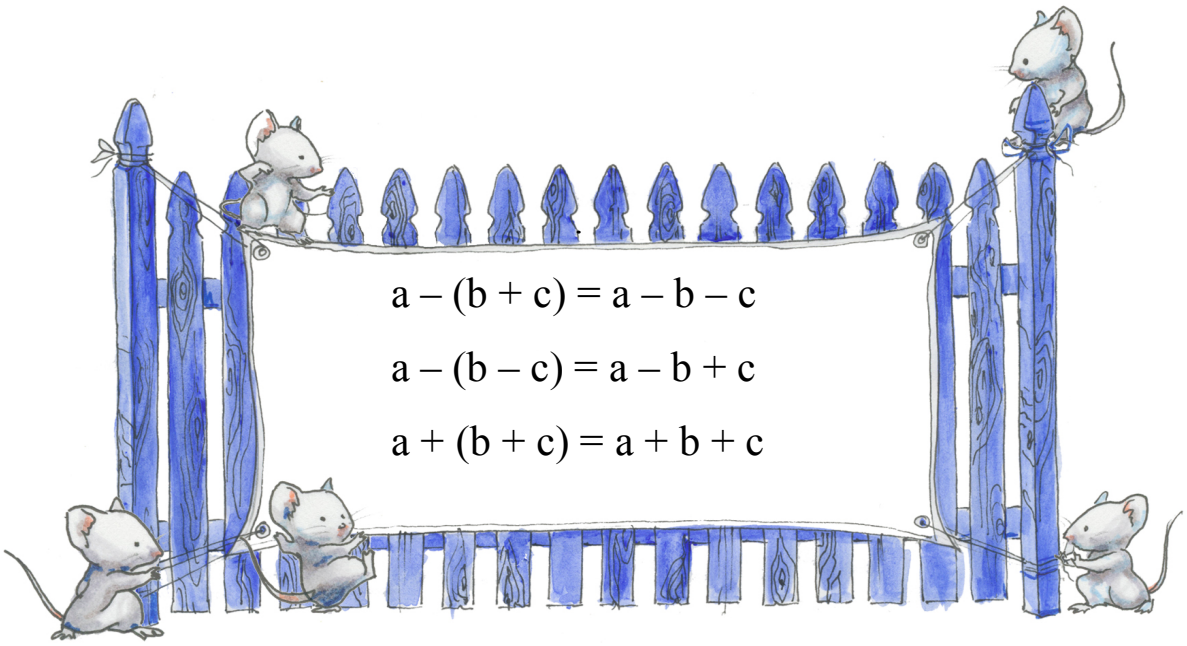
$20 - (4 + 5 + 6) =$ _____ $20 - 4 - 5 - 6 =$ _____

Why do you think you got the same result?

If we will remove parentheses in this expression: $20 + (4 + 5 + 6) =$ _____

Connect the equivalent expressions:

$34 - (12 + 6 + 3)$	$34 - 12 - 6 + 3$
$34 + (12 + 6 + 3)$	$34 - 12 - 6 - 3$
$34 - (12 + 6 - 3)$	$34 + 12 + 6 + 3$



Multiplication

Question: if we have 4 cars, and there are 3 persons in each car, how many people do we have altogether?

The answer can be obtained either by adding 3 + 3 + 3 + 3 =12 or by using operation of multiplication: instead of writing 3 + 3 + 3 + 3 (4 times), we write 3 x 4

The simple multiplication can be understood intuitively as a repeated addition.

Objects in rectangular arrays

If we have kittens arranged in 3 rows and 5 columns, we can get the total number of kittens in two ways:

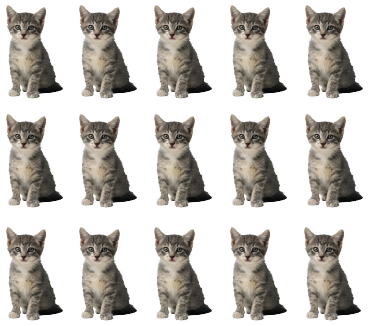
a) By rows:

(5 kittens in each row) x (3 rows) = **5 x 3 = 15** kittens

b) By columns:

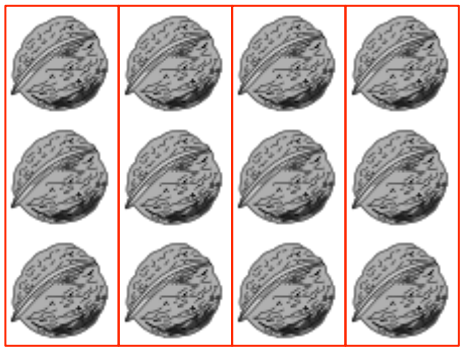
(3 kittens in each column) x (5 columns) = **3 x 5 = 15** kittens

The answer will be the same, no matter which way we use.



Is the number of walnuts the same on both pictures?

A 

B 

Number of walnuts in a row: ____ Number of walnuts in a column: ____

Number of rows: ____ Number of columns: ____

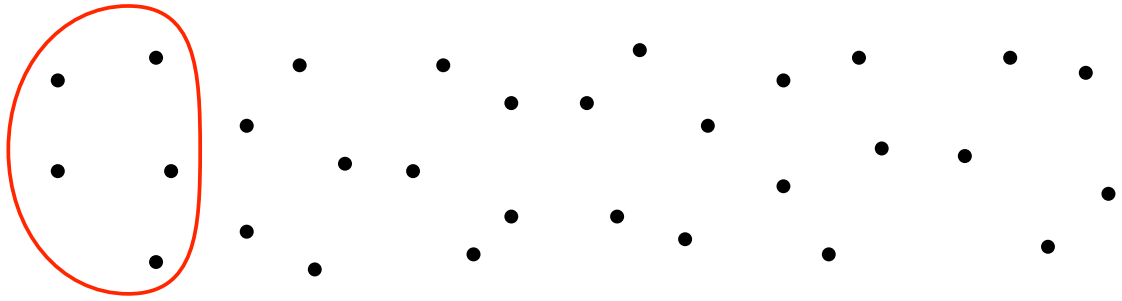
4 × 3 = ____ **3 × 4 = ____**

Each group of coins contains 4 coins and there are 5 groups.

Altogether there are $\underbrace{4 + 4 + 4 + 4 + 4}_{5 \text{ times}} = 20$ coins

Counting the same coins by multiplication yields: $4 \times 5 = 20$

8. Count the points by grouping them into sets of five: $5 \times \_\_ = \_\_\_$



9. Solve the problems:

a) The cost of each book is $4. What is the cost of 3 books? _____

b) The Smith family has five members. Each member has a small towel and a bath towel. How many towels hang in the bathroom? _____

c) The Jones family orders four pizzas to eat. Each pizza is sliced into four parts. How many pizza slices do they get? _____

d) Jones's ordered 4 pizzas again, sliced into four pieces each. This time the dog ate one piece. How many pieces did the people eat? _____

Challenge yourself

10.

Roman numerals:

1=I	2 = II	3=III	4=IV	5=V	6=VI	7 = VII
8=VIII	9=IX	10=X	20=XX	30=XXX	40=XL	50 = L
60 = LX	70 = LXX	80 = LXXX	90 = XC	100 = C	500 = D	1000 = M

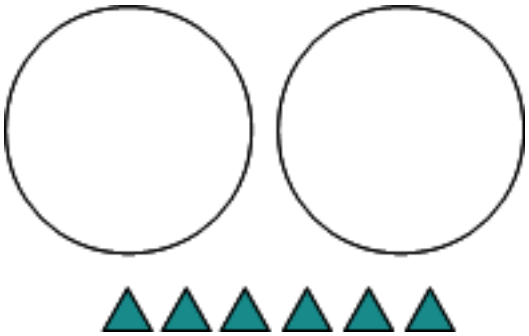
How would Roman write a) 18 _____ b) 273 _____?

Write Roman Numerals as a normal numbers

a) XXIX _____ b) CLX _____ c) CCCII _____

11.

There are 2 rings and 6 triangles. Move the rings and triangles so that each ring has 4 triangles in them.



Did you know …

Algorithms have a long history and the word can be traced back to the 9th century. At this time the Persian scientist, astronomer and mathematician Abdullah Muhammad bin Musa al-Khwarizmi, often cited as “The father of Algebra”, and was indirectly responsible for the creation of the term “Algorithm”. In the 12th century one of his books was translated into Latin, where his name was rendered in Latin as “Algorithm”. But this was not the beginning of algorithms.

In 1600 BC - Babylonians develop earliest known algorithms. The concept of algorithm was formalized in 1936 through Alan Turing's Turing machines, which in turn formed the foundation of computer science.