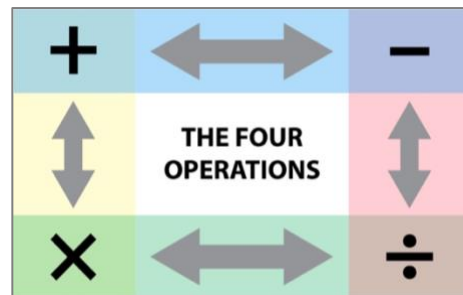
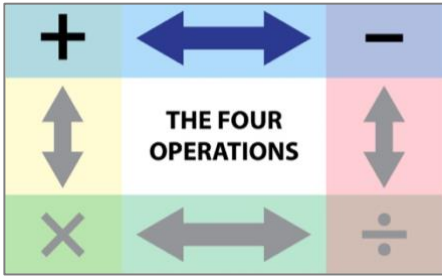
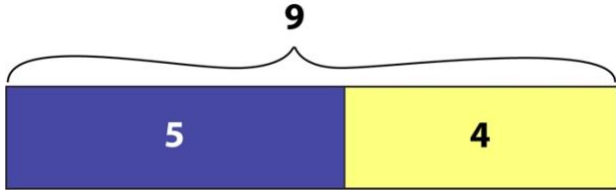
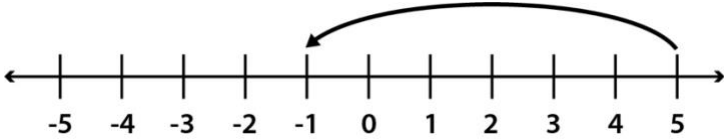
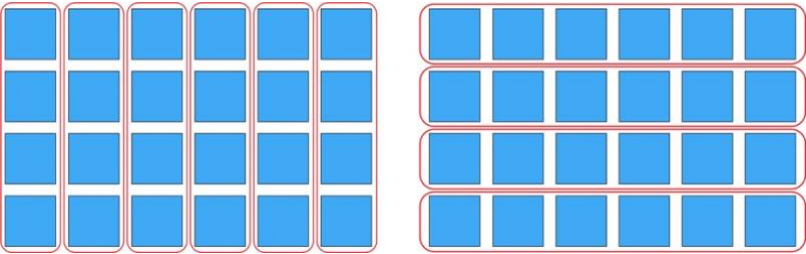
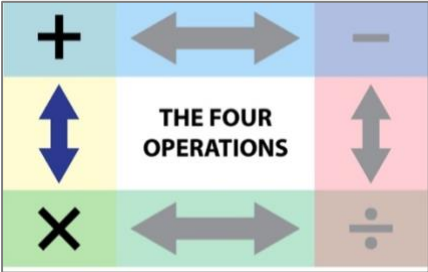
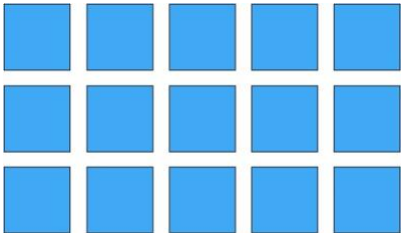


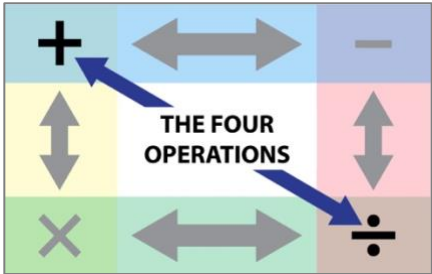
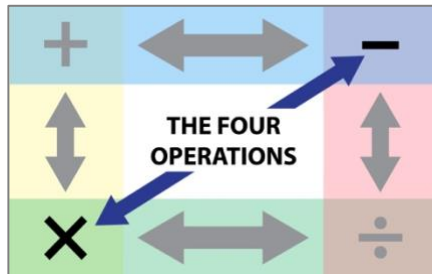
More Connections with THE FOUR OPERATIONS



Operations	Relationship between operations
Addition and Subtraction 	Addition and subtraction can both involve putting together or taking apart. Addition and subtraction can express the same relationship, for example: 5 and 4 are two parts that can be put together to make a whole of 9. These three equations show that relationship. $5 + 4 = 9$ $9 - 4 = 5$ $9 - 5 = 4$ Can you see the relationship in the picture?  The same operation can be expressed as addition or subtraction using signed numbers, for example: $5 - 6 = 5 + -6$  Addition and subtraction are inverse operations because if you add and then subtract the same number you end up back where you started. This also is true if you subtract and then add the same number. You can think of this as adding something and then taking it away ($5 + 4 - 4 = 5$) or taking something away and then putting it back ($5 - 4 + 4 = 5$).

Operations	Relationship between operations
Multiplication and Division 	Multiplication and division can both involve making or combining groups. Multiplication and division can express the same relationships. For example, 24 can be made of 6 groups of 4 or 4 groups of 6. These three equations show this relationship: $6 \times 4 = 24$ $24 \div 4 = 6$ $24 \div 6 = 4$ Can you see the relationship in the pictures?  Dividing by a fraction can be conceptualized as multiplication. If I want to know how many halves are in 5, I can multiply 5 by 2 because there are 2 halves in every whole.  $5 \div \frac{1}{2} = 5 \times 2$ Multiplication and division are inverse operations because if you multiply and then divide by the same number, you end up with the number you started with. This is also true if you divide and then multiply by the same number. You can think of this as combining groups and then splitting them apart ($15 \times 3 \div 3 = 15$) or dividing a number into equal groups and then putting the groups back together ($15 \div 3 \times 3 = 15$).

Operations	Relationship between operations
Addition and Multiplication 	Multiplication can mean combining groups of the same size, in other words adding the same number several times. For example, 5×3 can be thought of as 3 groups of 5 or 5 groups of 3. $5 \times 3 = 5 + 5 + 5 = 3 + 3 + 3 + 3 + 3 + 3$ Can you see all three expressions in the picture?  Addition and multiplication are both commutative operations. This means it doesn't matter which number you write first; the answer will be the same either way. $3 + 4 = 4 + 3 \text{ and } 3 \times 4 = 4 \times 3$
Subtraction and Division 	Division can mean taking away or subtracting equal sized groups until there is nothing left. The number of times you subtract a group is the answer to the division. For example: $15 \div 5$ can mean “How many 5s are in 15?” You can find out by subtracting 5s until you get to zero. $15 - 5 - 5 - 5 = 0$ We took away 5 three times, so $15 \div 5 = 3$ Subtraction and division are both <i>not commutative</i> operations. If you change which number is first, you get a different answer. $7 - 5 = 2 \text{ but } 5 - 7 = -2$ $10 \div 2 = 5 \text{ but } 2 \div 10 = \frac{2}{5}$

Operations	Relationship between operations
Addition and Division  The diagram shows a 2x2 grid of operations: Addition (+) in the top-left, Subtraction (-) in the top-right, Multiplication (x) in the bottom-left, and Division (÷) in the bottom-right. Horizontal double-headed arrows connect addition and subtraction, and multiplication and division. Vertical double-headed arrows connect addition and multiplication, and subtraction and division. A central label 'THE FOUR OPERATIONS' has blue arrows pointing to each of the four operation symbols.	One meaning of division is “How many groups of this number are in that number?” For example, $15 \div 5$ can mean “How many 5s are in 15?” To find an answer, you can add up 5s until you get to 15. These sentences express the same relationship between 5 and 15: $15 \div 5 = 3$ $5 + 5 + 5 = 15$
Subtraction and Multiplication  The diagram is identical to the one above, showing the relationships between the four basic operations.	Multiplication can be thought of as combining groups. Because addition and subtraction have to do with putting together and taking apart, we can see subtraction relationships in multiplications. For example: $5 \times 3 = 15$ means $5 + 5 + 5 = 15$ which also means that $15 - 5 - 5 - 5 = 0$