# Algebra: Reading and reflecting on the textbook

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Here is some text from class 6 and 7 mathematics textbooks. After reading it you can discuss the questions given below:

> The main feature of the new branch which we are going to study is the use of letters. Use of letters will allow us to write rules and formulas in a general way. By using letters, we can talk about any number and not just a particular number. Secondly, letters may stand for unknown quantities. By learning methods of determining unknowns, we develop powerful tools for solving puzzles and many problems from daily life. Thirdly, since letters stand for numbers, operations can be performed on them as on numbers. This leads to the study of algebraic expressions and their properties.

Some questions:

1. Which chapter is this paragraph from?
2. What uses of school algebra are discussed in the paragraph?
3. Write down one example that illustrates each of the different uses of algebra.

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## 11.6 Use of Variables in Common Rules

Let us now see how certain common rules in mathematics that we have already learnt are expressed using variables.

### Rules from geometry

If we denote the perimeter of the rectangle by the variable $p$, the rule for perimeter of a rectangle becomes $\boldsymbol{p = 2l + 2b}$

> **Note :** Here, both $l$ and $b$ are variables. They take on values independent of each other. i.e. the value one variable takes does not depend on what value the other variable has taken.

## Rules from arithmetic

**5. Distributivity of numbers**

Suppose we are asked to calculate 7 × 38. We obviously do not know the table of 38. So, we do the following:

$7 \times 38 = 7 \times (30 + 8) = 7 \times 30 + 7 \times 8 = 210 + 56 = 266$

This is always true for any three numbers like 7, 30 and 8. This property is known as **distributivity of multiplication over addition of numbers.**

By using variables, we can write this property of numbers also in a general and concise way. Let $a$, $b$ and $c$ be three variables, each of which can take any number. Then, $\boldsymbol{a \times (b + c) = a \times b + a \times c}$

Some questions:

4. How are 'letters' being used in the two examples above?
5. What differences do you see between the first and the second example.
6. Can you think of some more examples like the ones above?

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The word *variable* means something that can vary, i.e. change. A **variable** *takes on different numerical values; its value is not fixed. Variables are denoted usually by letters of the alphabet, such as x, y, z, l, m, n, p etc. From variables, we form expressions*. The expressions are formed by performing operations like addition, subtraction, multiplication and division on the variables.

## 4.4 What Equation is?

In an equation there is always an **equality** sign. The equality sign shows that the value of the expression to the left of the sign (the left hand side or L.H.S.) is equal to the value of the expression to the right of the sign (the right hand side or R.H.S.). In

Some questions:

7. Formulate a problem that gives the equation $3x + 8 = 50$. How can the difficulty level of the problem be changed?
8. In the equation above, what is a better way of interpreting '$x$'? As a **variable**, or as an **unknown number**?

9. Can the problem(s) that you have made for question 7 above be solved without the use of algebra?

10. Can this problem be solved without the use of algebra: A farmer has hens and goats. There are altogether 50 heads and 140 feet. How many hens and how many goats does she have?

11. Two friends A and B traveled by train carrying 94 kg of luggage together. A paid Rs. 150 for excess luggage and B paid Rs. 200. If only A had traveled and carried all the luggage he would have paid Rs. 1350 for excess luggage. Find the maximum luggage allowed per person without excess charge. (Can this be solved without using algebra?)

12. Draw a 3 × 3 square on the calendar shown, so that you have nine dates inside the square. Add the three numbers in the middle column or the middle row. Do you notice any patterns? Any other patterns? Can you show that these patterns will hold for any square?

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| Mon | Tue | Wed | Thu | Fri | Sat | Sun |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | | | | | |