

# 1.5 Variables in Algebra & Translating Words into Mathematical Symbols

Standards:

A.SSE.1

A.SSE.1a

A.SSE.1b



## [Old] Solving Equations

$$\textcircled{1} \quad x+3 = -5$$

$$x+3 \xrightarrow{-3} = -5 \xrightarrow{-3}$$

$$x = -8.$$

$$\textcircled{2} \quad \frac{2x}{2} = \frac{5}{2}$$

$$x = \frac{5}{2} = 2\frac{1}{2}$$

$$\textcircled{3} \quad 7x+2 = -54$$

$$7x+2 \xrightarrow{-2} = -54 \xrightarrow{-2}$$

$$\frac{7x}{7} = \frac{-56}{7}$$

$$x = -8.$$

## [New-A] Interpreting Expressions

Translating words into mathematical symbols are essential for solving real world problems. To do this, we need to look for key words (i.e. sum, difference, per, etc.) that indicate mathematical operations.

Different ways to say "add":

- increased by
- together
- more than
- combined
- add to
- sum of
- total of

[Example]

Five added to three

$$5 + 3$$

Different ways to say "subtract":

- decreased by
- difference of
- minus
- fewer than
- less than
- difference between
- subtracted by

[note] order matters

[Examples]

- Five minus three  
 $5 - 3$

- Five subtracted from three  
 $3 - 5$

(same as  
less than)

Different ways to say "multiply":

- of
- product of
- times
- multiply by
- increased by a factor of

[Examples]

- The product of 5 and 3  
 $5 \cdot 3$

Different ways to say "divide":

- per
- out of
- quotient of
- product of
- ratio of
- percent of

[Example]  
The ratio of 5 to 3  
 $\frac{5}{3}$

Different ways to "equal"

- is
- were
- yields
- are
- will be
- sold for
- was
- gives

[Example]  
The difference of 5 and 3 is 2  
 $5 - 3 = 2$ .

Different ways to hint at inequality

- is less than
- is greater than
- at most
- no more than

[Example]  
5 is less than 7  
 $5 < 7$

Let's consider the following situation:

$$1 + 3$$

$$2 + 3$$

$$3 + 3$$

$$4 + 3$$

⋮

Generalize the pattern:

$$\boxed{x + 3}$$

What is a variable? A variable is a representation of a number of a value. We use variables to make general mathematical statements.

Components of an Expression:

- variable — representation of value
- coefficient — numbers in front of variables
- constant — a fixed number

[Examples] Identify the parts of each expression.

①  $7x + 3y + 6$

- Variable:  $x, y$
- Coefficient: 7 is coefficient to  $x$   
3 is coefficient to  $y$
- Constant: 6
- How many terms? 3

②  $4 + 6z$

- Variable:  $z$
- coefficient: 6 is coefficient to  $z$
- constant: 4
- How many terms? 2

## new-B Creating Expressions

[Examples] Write the math statement.

- ① Four times a number.  $4x$
- ② The sum of 5 and a number.  $5 + n$
- ③ Five subtracted from a number.  $n - 5$
- ④ Five minus a number.  $5 - n$
- ⑤ Jaden paid 6 dollars per hour.  $6h$ .
- ⑥ Zoe gets flat fee of \$7 for working and \$9 for every shirt.  $\$9s + 7$

[Examples] Find the number.

- ① 4 times a number is 16. Find the number.  $4n = 16$   
 $n = 4$ .
- ② Twenty increased by a number will be 30. Find the number.  $n + 20 = 30$   
 $n = 10$ .
- ③ Allison spends \$6 dollars on food and make \$5 an hour at work. How many hours did she work if she totalled \$29.  $5h - 6 = 29$   
 $5h = 35$   
 $h = 7 \text{ hours}$ .