T&T1_Chp6_Algebra_KeyWords

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Integers Z $\{-3,-2,-1,0,1,2,\}$

① ADD Integers

$+7+2=+9$

$-8-4=-12$

} Rule: Add + keep the same sign

② Subtract

$-7+4=-3$

$+11-6=+5$

} Rule: subtract + keep the sign of the bigger number.

③ Multiplication

$-1\times-2=+2$ $\ominus\times\ominus=\oplus$

$+3\times+4=+12$ $\oplus\times\oplus=\oplus$

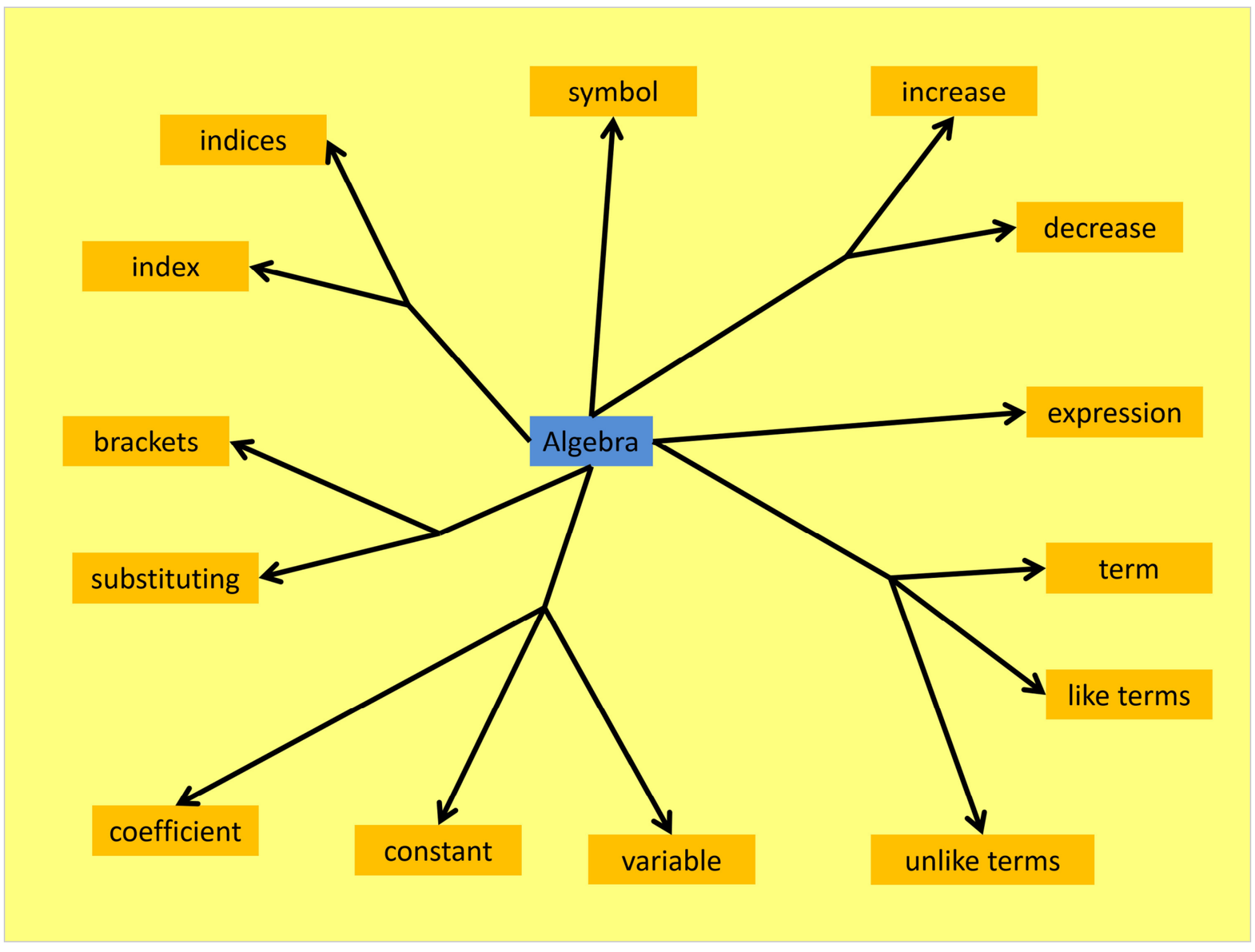
$-6\times+2=-12$ $\ominus\times\oplus=\ominus$

$\oplus\times\ominus=\ominus$

④ Division

$\frac{8}{4}=2$ $\frac{\oplus}{\oplus}=\oplus$ $\frac{-7}{1}=-7$ $\frac{\ominus}{\oplus}=\ominus$

$\frac{-10}{-5}=2$ $\frac{\ominus}{\ominus}=\oplus$ $\frac{+11}{-11}=-1$ $\frac{\oplus}{\ominus}=\ominus$



Section 6.1

Symbols such as ▲, ● or ◆ are often used to stand for numbers.

Sometimes you can work out the value of the symbol.

Look at this example:

▼ + 8 = 12

We know that 4 + 8 = 12, so this means that ▼ = 4

You can also use the value of a symbol in a calculation.

If ● = 7, then 6 × ● = 42.

Writing in symbols

'3 more than 5' can be written as 5 + 3.

'6 less than 14' can be written as 14 − 6.

'10 increased by 4' can be written as 10 + 4.

In the same way

'5 more than ■' can be written as ■ + 5.

'7 more than *n*' can be written as *n* + 7.

'8 less than *x*' can be written as *x* − 8.

Exercise 6.1

1. Each symbol stands for a number. Write down its value.

(i) ▲ + 3 = 5 (ii) ■ − 5 = 4 (iii) 6 × 2 = 12 (iv) 3 + ◆ = 15

(v) 9 − 7 = 2 (vi) 5 × ▮ = 55 (vii) 12 ÷ 3 = 4 (viii) 30 ÷ 10 = 3

x − 5 = 4
+5 | x = 9 | +5

iii) 2x = 12
÷2 | x = 6 | ÷2

iv) 3 + x = 15
−3 | x = 12 | −3

2. Find the value of each of these symbols:

(i) 11 − 8 = 3 (ii) 14 + 7 = 21

(iii) 10 + 10 = 20 (iv) 10 + 10 + 10 = 30

(v) 20 − 6 = 14 (vi) 4 × 4 = 16

(vii) 5 × 4 = 20 (viii) 30 ÷ 6 = 5

3. If □ + ▲ = 12, find three pairs of values for □ and ▲.

5 + 7 = 12
10 + 2 = 12
9 + 3 = 12
8 + 4 = 12
11 + 1 = 12

4. If ● − ◆ = 9, find three pairs of values for ● and ◆.

18 - 9 = 9
12 - 3 = 9
10 - 1 = 9
15 - 6 = 9
19 - 10 = 9
14 - 5 = 9
11 - 2 = 9
200 - 191 = 9
20 - 11 = 9

5. If ● = 5 and ■ = 3, find the value of each of these expressions:

(i) 5 + 6 = 11 (ii) 3 × 5 = 15 (iii) 5 − 2 = 3 (iv) 7 + 3 = 10

(v) 3 × 5 = 15 (vi) 6 ÷ 3 = 2 (vii) 30 ÷ 5 = 6 (viii) 2 × 3 + 5 = 11

6. If ▲ = 18, write down the value of each of these:

(i) 6 more than ▲ = 24 (ii) 3 less than ▲ 15 (iii) twice ▲ = 36

(iv) five times ▲ 90 (v) ▲ less 8 10 (vi) twice ▲ + ▲

36 + 18 = 54

7. ■ stands for different numbers. Find its value in each of the following:

(i) 4 + 6 = 10 (ii) 8 − 3 = 5 (iii) 7 + 7 = 14

(iv) 2 × 11 = 22 (v) 36 ÷ 4 = 9 (vi) 3 × 12 = 36

8. ▲ stands for a number. Write down each of these using symbols and numbers only:

(i) 7 more than ▲ (ii) 4 less than ▲ (iii) twice ▲

(iv) ▲ divided by 2 (v) $\frac{1}{3}$ of ▲ (vi) ▲ less 6

i) Δ+7

ii) Δ− 4

iii) 2(Δ) or Δ×2

iv) Δ ÷ 2 or $\frac{\Delta}{2}$

v) Δ × $\frac{1}{3}$ or $\frac{1}{3}$(Δ)

vi) Δ− 6

9. The first line in the table below has been completed.
Write down what should go in each shaded space in the remaining lines.

	Start number	Change	Result
	3	Increase by 7	3 + 7 = 10
(i)	9	Increase by 12	9+12 = 21
(ii)	12	Increase by 6	12 + 6 = 18
(iii)	21	Increase by 8	21 + 8 = 29
(iv)	□	Increase by 5	□ + 5
(v)	▼	Increase by 8	▼ + 8
(vi)	●	Increase by 17	● + 17
(vii)	16	Decrease by 3	16 − 3 = 13
(viii)	▭	Decrease by 12	■ − 12
(ix)	▲	Decrease by 36	Δ − 36
(x)	◗	Decrease by 9	◗ − 9

HW

10. Each letter stands for a number. What is each number?

(i) $a + 2 = 6$ (ii) $b + 3 = 12$ (iii) $c - 4 = 5$ (iv) $d - 2 = 9$
(v) $9 - e = 3$ (vi) $2 \times f = 16$ (vii) $g + g = 12$ (viii) $h \div 3 = 6$
(ix) $i + i + i = 12$

HW.

11. Write down what should be written in each of the shaded boxes below.
The first one is done for you.

	Start number	Change	Result
(i)	x	Increase by 6	$x + 6$
(ii)	a	Increase by 8	
(iii)	b	Decrease by 7	
(iv)	c	Double	
(v)	d		$d + 9$
(vi)	e		$e - 10$
(vii)	f	Multiply by 5	
(viii)	g		$3g$
(ix)	h		$h + k$

Mistake

Section 6.2 Using Letters

James bought some DVDs but we don't know how many.
He also has seven of his own.
We could say that he bought x DVDs.
Now he has $\boldsymbol{x + 8}$ DVDs.

$\boldsymbol{x + 8}$ is an **expression**.
x stands for an unknown number.

The expression $x + x + 2 + 5$ has four **terms**.
The expression can be simplified to $2x + 7$ which has 2 terms.
Notice that $x + x$ can be added to get $2x$.
$x + x$ can be added because they are **like terms**.

Consider the cars and vans below:

3 cars + **2** cars = **5** cars

What is  = ?

Three vans and two cars cannot be added as they are not like terms. In algebra, terms with the same letter such as $2x$ and $3x$ can be added as they are **like terms**.

Thus $2x + 3x = 5x$ and $2y + 4y = 6y$.

However, $5x$ and $7y$ are **unlike terms** and cannot be added.

$2x + 3y + 4$ is an **expression** containing 3 terms. We don't know the values of x and y.

x and y can have different values in another expression.

That is why x and y are called **variables**. They are given this name because their values **vary**. The number **4** does not change. Since it is fixed, we call it a **constant**.

In **2**x, the number **2** tells us how many xs there are.

We call 2 the **coefficient** of x. Similarly 3 is the coefficient of y.