

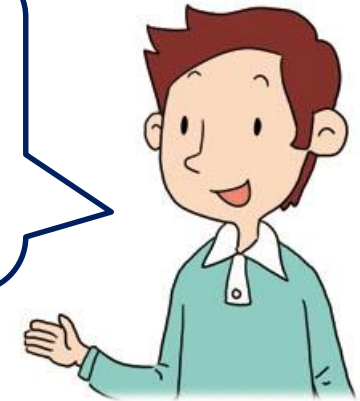
# Addition and Subtraction of Polynomials

## ◆ Addition and Subtraction of Polynomials



# Addition and Subtraction of Polynomials

We have learnt that terms having the same variables with the **same indices** are called **like terms**.  
Also, all **constant terms** are **like terms**.



$2y$  and  $-y$  are like terms.

$-a^2b$  and  $3a^2b$  are like terms.

$b^3a^2$  and  $a^3b^2$  are unlike terms.

$-4$  and  $9$  are like terms.

$3$  and  $3x$  are unlike terms.

$3ab$  and  $-2ba$  are like terms.

# Addition and Subtraction of Polynomials



When we perform addition and subtraction of polynomials, we have to **combine the like terms**.

Step 1: Remove the brackets.

Step 2: Group the like terms.

Step 3: Combine the like terms.

$$\begin{aligned} \text{e.g. } & (4a^2 + 3a) + (7a - a^2) \\ & = 4a^2 + 3a + 7a - a^2 \\ & = 4a^2 - a^2 + 3a + 7a \\ & = \underline{3a^2 + 10a} \end{aligned}$$

# Addition and Subtraction of Polynomials

Simplify each of the following expressions.



$$\begin{aligned} \text{(a)} \quad & (5a - 2b) - (a + 7b) \\ & = 5a - 2b - a - 7b \\ & = 5a - a - 2b - 7b \\ & = \underline{4a - 9b} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & (-a + b + 10) + (6a + b - 1) \\ & = -a + b + 10 + 6a + b - 1 \\ & = -a + 6a + b + b + 10 - 1 \\ & = \underline{5a + 2b + 9} \end{aligned}$$

# Addition and Subtraction of Polynomials



Add  $a^2 - 3a + 8$  to  $2a^3 - 3 + 5a$ .

$$\begin{aligned} & (a^2 - 3a + 8) + (2a^3 - 3 + 5a) \\ &= a^2 - 3a + 8 + 2a^3 - 3 + 5a \\ &= 2a^3 + a^2 - 3a + 5a + 8 - 3 \\ &= \underline{2a^3 + a^2 + 2a + 5} \end{aligned}$$

# Addition and Subtraction of Polynomials

Subtract  $2 + a - 4a^2 - 5a^3$  from  
 $-a^3 + 9a^2 + 3a - 6$ .



$$\begin{aligned} & (-a^3 + 9a^2 + 3a - 6) - (2 + a - 4a^2 - 5a^3) \\ &= -a^3 + 9a^2 + 3a - 6 - 2 - a + 4a^2 + 5a^3 \\ &= -a^3 + 5a^3 + 9a^2 + 4a^2 + 3a - a - 6 - 2 \\ &= \underline{4a^3 + 13a^2 + 2a - 8} \end{aligned}$$

# Addition and Subtraction of Polynomials

We can also perform addition and subtraction of polynomials in columns.



e.g. Simplify  $(2b^2 - b) + (b^2 - 5b)$ .

$$\begin{array}{r} 2b^2 - b \\ +) \quad b^2 - 5b \\ \hline 3b^2 - 6b \end{array}$$

Arrange like terms in the same column.

$$2b^2 + b^2 = 3b^2$$

$$-b + (-5b) = -6b$$

# Addition and Subtraction of Polynomials



Simplify  $(-5b^2 + b - 4) + (b^2 - 2b - 1)$  and present the steps in columns.

$$\begin{array}{r} -5b^2 + b - 4 \\ +) \quad b^2 - 2b - 1 \\ \hline -4b^2 - b - 5 \end{array}$$



# Addition and Subtraction of Polynomials

Simplify  $(3b^2 + 6b + 7) - (-b^2 + 4b - 8)$   
and present the steps in columns.



$$\begin{array}{r} 3b^2 + 6b + 7 \\ -) \quad -b^2 + 4b - 8 \\ \hline \underline{\underline{4b^2 + 2b + 15}} \end{array}$$