

## 1 Addition et soustraction

$$\begin{aligned}
 a + b &= b + a \\
 a - b &= -(b - a) \\
 a + (-b) &= a - b \\
 a - (-b) &= a + b \\
 a + (b + c) &= a + b + c = (a + b) + c \\
 a + (b - c) &= a + b - c = (a + b) - c \\
 a + (-b + c) &= a - b + c = (a - b) + c \\
 a + (-b - c) &= a - b - c = (a - b) - c \\
 a - (b + c) &= a - b - c = (a - b) - c \\
 a - (b - c) &= a - b + c = (a - b) + c \\
 a - (-b + c) &= a + b - c = (a + b) - c \\
 a - (-b - c) &= a + b + c = (a + b) + c
 \end{aligned}$$

## 2 Multiplication

$$\begin{aligned}
 a \cdot b &= b \cdot a \\
 a \cdot (-b) &= \ominus ab = (-a) \cdot b \\
 a \cdot (b \cdot c) &= a \cdot b \cdot c = (a \cdot b) \cdot c \\
 a \cdot b \cdot c &= a \cdot c \cdot b \\
 &= b \cdot a \cdot c \\
 &= b \cdot c \cdot a \\
 &= c \cdot a \cdot b \\
 &= c \cdot b \cdot a
 \end{aligned}$$

## 3 Multiplication et addition

$$\begin{aligned}
 a \cdot (b + c) &= a \cdot b + a \cdot c \\
 a \cdot (b - c) &= a \cdot b - a \cdot c \\
 (a + b) \cdot c &= a \cdot c + b \cdot c \\
 (a - b) \cdot c &= a \cdot c - b \cdot c \\
 (a + b) \cdot (c + d) &= a \cdot c + a \cdot d + b \cdot c + b \cdot d \\
 (a + b) \cdot (c - d) &= a \cdot c - a \cdot d + b \cdot c - b \cdot d \\
 (a - b) \cdot (c + d) &= a \cdot c + a \cdot d - b \cdot c - b \cdot d \\
 (a - b) \cdot (c - d) &= a \cdot c - a \cdot d - b \cdot c + b \cdot d
 \end{aligned}$$

## 4 Fractions

$$\begin{aligned}
 \frac{a}{b} \oplus \frac{c}{d} &= \frac{a \cdot d \oplus b \cdot c}{b \cdot d} & \frac{a}{b} \ominus \frac{c}{d} &= \frac{a \cdot d \ominus b \cdot c}{b \cdot d} \\
 \frac{a}{b} &= a \cdot \frac{1}{b} & \frac{\frac{a}{b}}{\frac{c}{d}} &= \frac{a}{b} \cdot \frac{d}{c} = \frac{a \cdot d}{b \cdot c} \\
 \frac{-a}{b} &= \ominus \frac{a}{b} = \frac{a}{-b} & \frac{\frac{a}{c}}{\frac{d}{e}} &= \frac{a}{1} \cdot \frac{e}{d} = \frac{a \cdot e}{d} \\
 \frac{a \pm b}{c} &= \frac{a}{c} \pm \frac{b}{c} & \frac{\frac{a}{b}}{c} &= \frac{a}{b} \cdot \frac{1}{c} = \frac{a}{b \cdot c} \\
 \frac{a}{b} \cdot \frac{c}{d} &= \frac{a \cdot c}{b \cdot d} & &
 \end{aligned}$$

## 5 Puissances

$$(a \cdot b)^p = a^p \cdot b^p$$

$$\left(\frac{a}{b}\right)^p = \frac{a^p}{b^p}$$

$$a^p \cdot a^q = a^{p+q}$$

$$\frac{a^p}{a^q} = a^{p-q}$$

$$a^{-p} = \frac{1}{a^p}$$

$$(a^p)^q = a^{pq}$$

## 6 Identités Remarquables

$$(a + b)^2 = a^2 + b^2 \oplus 2 \cdot a \cdot b$$

$$(a - b)^2 = a^2 + b^2 \ominus 2 \cdot a \cdot b$$

$$(-a + b)^2 = a^2 + b^2 \ominus 2 \cdot a \cdot b$$

$$(-a - b)^2 = a^2 + b^2 \oplus 2 \cdot a \cdot b$$

$$(a + b) \cdot (a - b) = a^2 - b^2$$

$$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$

$$(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$$

$$a^3 - b^3 = (a - b) \cdot (a^2 + ab + b^2)$$

$$a^3 + b^3 = (a + b) \cdot (a^2 - ab + b^2)$$