

## 1 RAPPELS SUR QUELQUES REGLES DES CALCULS

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Associativité :

$$a + b = b + a$$

$$a \times b = b \times a$$

$$a \times b \times c = b \times c \times a$$

Pour une équation :

$$A = B \Leftrightarrow B = A$$

Règles basiques de calculs :

$$a = \frac{a}{1} \quad \frac{a}{a} = 1$$

$$\frac{a+b}{c} = \frac{a}{c} + \frac{b}{c}$$

$$\frac{a}{b} \times \frac{c}{d} = \frac{(a \times c)}{b \times d}$$

$$a \times \frac{b}{c} = \frac{a}{c} \times b = \frac{a \times b}{c}$$

$$\frac{k \times a}{k \times b} = \frac{\cancel{k} \times a}{\cancel{k} \times b} = \frac{a}{b}$$

$$\frac{k \times a + b}{k \times c} \neq \frac{a+b}{c}$$

On ne barre pas les  
k dans ce cas là !!!



$$\frac{k \times (a+b)}{k \times c} = \frac{\cancel{k} \times (a+b)}{\cancel{k} \times c} = \frac{a+b}{c}$$

Ici par contre on  
peut les barrer !



$$\frac{\frac{a}{b}}{\frac{c}{d}} = \frac{a}{b} \times \frac{d}{c}$$

Avec les signes :

$$-(a \times b) = (-a) \times b = a \times (-b) \neq (-a) \times (-b)$$

$$-\frac{a}{b} = \frac{-a}{b} = \frac{a}{-b} \neq \frac{-a}{-b}$$

Factorisation :

$$k \times a + k \times b = k(a + b)$$

$$k \times a + k \times b + k \times c = k(a + b + c)$$

Distributivité :

$$k(a + b) = (a + b)k = k \times a + k \times b$$

$$-(a + b) = -a - b$$

$$-(a - b) = -a + b$$

$$-(-a - b) = a + b$$

Transformer une expression :

$$-a + b = -(a - b)$$

$$\frac{-a - b}{-c} = \frac{a + b}{c}$$

$$\frac{-a + b}{-c} = \frac{a - b}{c}$$

Puissances :

$$a^0 = 1$$

$$a^1 = a$$

$$a^n \times a^m = a^{n+m}$$

$$\frac{a^n}{a^m} = a^{n-m}$$

$$(a^n)^m = a^{nm}$$

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

$$a^n \times b^n = (ab)^n$$

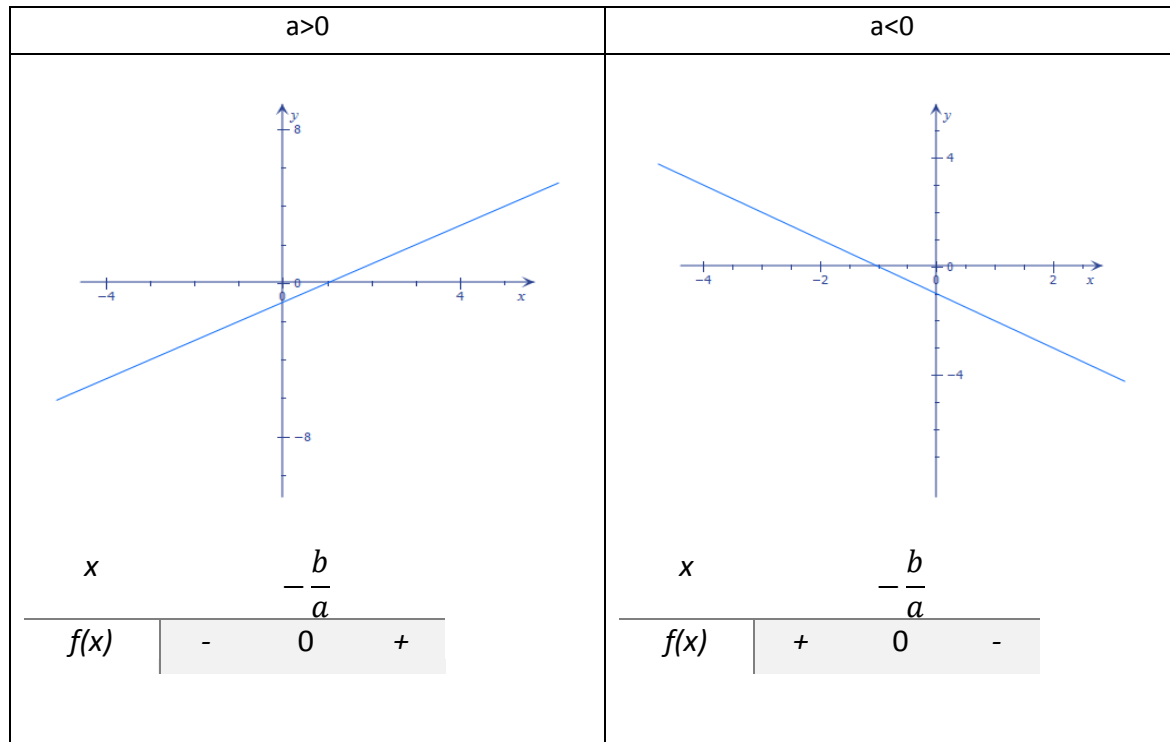
$$a \times b^n \neq (a \times b)^n$$



ATTENTION !!!

## 2 FONCTIONS AFFINES - $f(x) = ax + b$

$$ax + b = 0 \Leftrightarrow ax = -b \Leftrightarrow x = -\frac{b}{a}$$



## 3 FONCTIONS POLYNOME DE DEGRE 2 - $f(x) = ax^2 + bx + c$

### 3.1 RESOLUTION DE L'EQUATION : $ax^2 + bx + c = 0$

Calcul du discriminant :  $\Delta = b^2 - 4ac$

Si  $\Delta < 0$  : Aucune racine (pas de solution à l'équation) -> Pas de forme factorisée

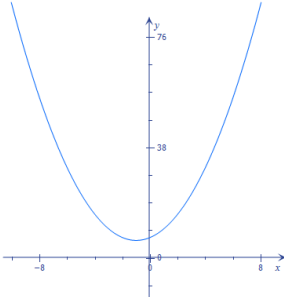
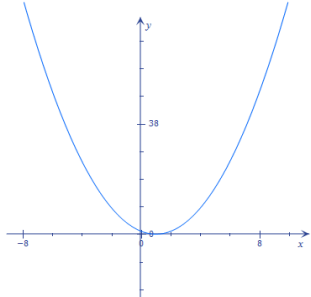
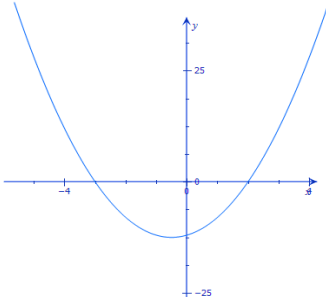
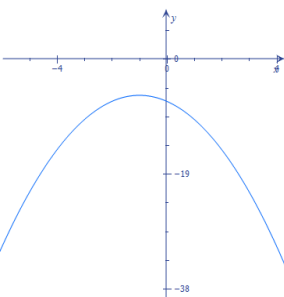
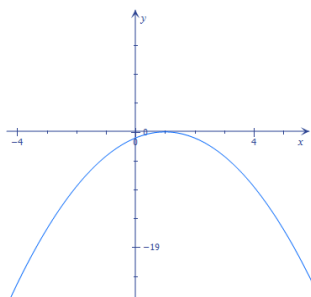
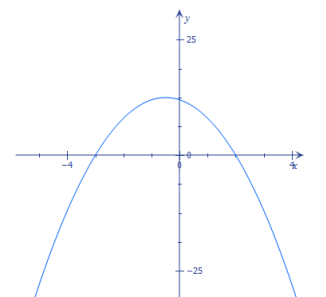
Si  $\Delta = 0$  : 1 racine (solution de l'équation) :  $x_0 = \frac{-b}{2a}$

Forme factorisée :  $f(x) = a(x - x_0)^2$

Si  $\Delta > 0$  : 2 racines (solutions de l'équation) :  $x_1 = \frac{-b - \sqrt{\Delta}}{2a}$  et  $x_2 = \frac{-b + \sqrt{\Delta}}{2a}$

Forme factorisée :  $f(x) = a(x - x_1)(x - x_2)$

### 3.2 SIGNE DE $f(x)$

|         | $\Delta < 0$                                                                                                                                                                                    | $\Delta = 0$ | $\Delta > 0$ |                                                                                                                                                                                                                                                                               |        |   |   |   |                                                                                                                                                                                                                                                                                                                                                           |        |   |   |   |   |   |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---|---|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---|---|---|---|---|
| $a > 0$ | <div></div> <div><math>x</math></div> <div><table><tr><td><math>f(x)</math></td><td>+</td></tr></table></div>  | $f(x)$       | +            | <div></div> <div><math>x</math><span style="margin-left: 100px;"><math>x_0</math></span></div> <div><table><tr><td><math>f(x)</math></td><td>+</td><td>0</td><td>+</td></tr></table></div>  | $f(x)$ | + | 0 | + | <div></div> <div><math>x</math><span style="margin-left: 80px;"><math>x_1</math></span><span style="margin-left: 80px;"><math>x_2</math></span></div> <div><table><tr><td><math>f(x)</math></td><td>+</td><td>0</td><td>-</td><td>0</td><td>+</td></tr></table></div>  | $f(x)$ | + | 0 | - | 0 | + |
| $f(x)$  | +                                                                                                                                                                                               |              |              |                                                                                                                                                                                                                                                                               |        |   |   |   |                                                                                                                                                                                                                                                                                                                                                           |        |   |   |   |   |   |
| $f(x)$  | +                                                                                                                                                                                               | 0            | +            |                                                                                                                                                                                                                                                                               |        |   |   |   |                                                                                                                                                                                                                                                                                                                                                           |        |   |   |   |   |   |
| $f(x)$  | +                                                                                                                                                                                               | 0            | -            | 0                                                                                                                                                                                                                                                                             | +      |   |   |   |                                                                                                                                                                                                                                                                                                                                                           |        |   |   |   |   |   |
| $a < 0$ | <div></div> <div><math>x</math></div> <div><table><tr><td><math>f(x)</math></td><td>-</td></tr></table></div> | $f(x)$       | -            | <div></div> <div><math>x</math><span style="margin-left: 100px;"><math>x_0</math></span></div> <div><table><tr><td><math>f(x)</math></td><td>-</td><td>0</td><td>-</td></tr></table></div> | $f(x)$ | - | 0 | - | <div></div> <div><math>x</math><span style="margin-left: 80px;"><math>x_1</math></span><span style="margin-left: 80px;"><math>x_2</math></span></div> <div><table><tr><td><math>f(x)</math></td><td>-</td><td>0</td><td>+</td><td>0</td><td>-</td></tr></table></div> | $f(x)$ | - | 0 | + | 0 | - |
| $f(x)$  | -                                                                                                                                                                                               |              |              |                                                                                                                                                                                                                                                                               |        |   |   |   |                                                                                                                                                                                                                                                                                                                                                           |        |   |   |   |   |   |
| $f(x)$  | -                                                                                                                                                                                               | 0            | -            |                                                                                                                                                                                                                                                                               |        |   |   |   |                                                                                                                                                                                                                                                                                                                                                           |        |   |   |   |   |   |
| $f(x)$  | -                                                                                                                                                                                               | 0            | +            | 0                                                                                                                                                                                                                                                                             | -      |   |   |   |                                                                                                                                                                                                                                                                                                                                                           |        |   |   |   |   |   |