Al-Mahdi High School	Mathematics	11^{th}-Grade
Name:	Sum & Product of a quadratic equation	A.S-2

Goals: 1) *Define the Sum & Product of roots of a complete quadratic equation.*
2) *Express a quadratic equation in terms of sum and product of its roots.*
3) *Test if a quadratic equation admits an evident root, and find the second root.*

Focusing event:

Can you find two natural numbers whose:

a) sum is 4 and product is 3?(show your work)
……………………………………………………………………………………………..
……………………………………………………………………………………………..

b) sum is 12and product is 5?(show your work)
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……………………………………………………………………………………………..

I- Consider the quadratic equation: $f(x) = ax^2 + bx + c = 0$.

1) Complete the following: $\alpha \,\&\, \beta$ are two distinct roots of $f(x)$, if: $f(\alpha) =$ …… & ……….
2) Find for these roots their:
   - ***i.*** Sum: $S =$ ……….. = ……………
   - ***ii.*** Product: $P =$ ………….. = …………………………
3) What do the factors $(x-\alpha) \& (x-\beta)$ represent for $f(x)$?
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4) Deduce the factorized form of $f(x)$:
…………………………………………………………………………………………………
5) Write the expanded form of $f(x)$ in terms of $\alpha \,\&\, \beta$:
…………………………………………………………………………………………………
6) Express the quadratic equation $ax^2 + bx + c = 0$ in terms of S & P:
………………………………………………………………………………………
7) If $f(x)$ can be written in the form: $x^2 - Sx + P = 0$, then specify the condition for which $f(x)$ admits two real roots: ……………………………………………………………

Conclusion:	A second degree equation can be written in the form: $x^2 - Sx + P = 0$. And it admits two real roots iff: $\Delta \geq 0$ That is to say if: $S^2 - 4p \geq 0$

Evident root of a second degree trinomial

II- Answer the following:

a) Complete the following table:

Expression	Sum: $a+b+c$	$f_i(1)$	$f_i\left(\frac{c}{a}\right)$
$f_1(x)=x^2-4x+3$			
$f_2(x)=x^2+6x-7$			
$f_3(x)=3x^2-5x+2$			
$f_4(x)=x^2-2x+2$			
$f_5(x)=2x^2-3x+5$			
$f_6(x)=x^2+x-3$			

b) Which of the above admits:

a. A zero sum? ……………………………………………………………………………………

b. $1\ \&\ \frac{c}{a}$ as roots? ……………………………………………………………………

c) What do you conclude? …………………………………………………………………………

III- Determine in simplest way possible the roots of the following quadratic equations:

a) $x^2+3x-4=0$ ……………………………………………………………………………..

b) $2x^2-5x+3=0$ ……………………………………………………………………………..

c) $3x^2+7x+4=0$ ……………………………………………………………………………..

Conclusion:

In a second degree equation of the form $ax^2+bx+c=0$:

- ✓ If $a+b+c=0$ then the given equation admits:
  - $x_1=1$ as an evident root.
  - And $x_2=P=\frac{c}{a}$ as a 2nd root.
- ✓ If $b=a+c$ then the given equation admits:
  - $x_1=-1$ as an evident root.
  - And $x_2=-P=-\frac{c}{a}$ as a 2nd root.