Lycée Des Arts	*Mathematics*	*9^{th}-Grade*
Name:	*Square roots*	*A.S-3*

1- Find the squares of the real numbers:

The real numbers	3	-5	-4	-2	-1.1	0	1.2	7
Their squares								

a. Can you find a ***real*** number in which its square is negative? ……………………………

b. What do you notice? ……………………………………………………………………..

2- Complete the following table:

	1^{st} - couple		2^{nd} - couple		3^{rd} - couple	
Numbers	2	-2	$\frac{1}{5}$	$-\frac{1}{5}$	a	$-a$
Their squares						

a. What do you notice about the squares of the above opposite numbers?

……………………………………………………………………………………………

b. Generalize what you have found: ……………………………………………………………

3- Find the real numbers whose squares are presented in the following table:

Numbers	0		1		100		3600		0.09		0.0016	
Square form			$(-1)^2$	$(+1)^2$								
Sign of base			-ve	+ve								

4- Remember that:

Since the square of	-1 & $+1$	is equal to	1	then	-1 & $+1$	are called the square roots of	1
	-7 & $+7$		49		-7 & $+7$		49

What is a radical?

By definition the ***positive square root*** of a positive real number is called the ***radical***.

Eg: Compute the following:

- $Radical(121) =$ .... - $Radical(81) =$ ....
- $Radical(225) =$ .... - $Radical(49) =$ ....

Instead of writing radical (25) we can use the symbol, $\sqrt[2]{25}$ or simply $\sqrt{25}$.

Terminology: $\text{index} \rightarrow \sqrt[2]{a}$ ← radical sign, ← radicand *where a is any positive real number*

Calculate the following:

✓ $\sqrt{16}=$............	☆ $(16)^{\frac{1}{2}}=$............	a) What do you notice? …………………
✓ $\sqrt{25}=$............	☆ $(25)^{\frac{1}{2}}=$............	……………………………………………………
✓ $\sqrt{64}=$............	☆ $(64)^{\frac{1}{2}}=$............	b) What do you conclude? ……………
		……………………………………………………

Correct the following false statements:

a) A non-zero real number admits two square roots.…………………………………………

b) To find the square root of a number, we divide it by 2…………………………………

c) 2 is the square root of -4. ……………………………………………………………

5- Consider the table below:

Compute the numerical value of	For $x=1$	For $x=0$	For $x=3$	For $x=5$
$A=\sqrt{(x-2)^2}$				

6- Based on the above example find:

a. $\sqrt{(\pi-2)^2}=$ ……………

b. $\sqrt{(\pi-4)^2}=$ ……………

c. Study the simplified form of: $\sqrt{x^2}=$ ……………………………………………..

7- Use a calculator to compare:

No.	Expressions	Answer	Generalization	Condition(s)
a	$\sqrt{3}\times\sqrt{2}$ *and* $\sqrt{3\times 2}$		$\sqrt{a}\times\sqrt{b}=$ ……....	
b	$\frac{\sqrt{3}}{\sqrt{2}}$ *and* $\sqrt{\frac{3}{2}}$		$\frac{\sqrt{a}}{\sqrt{b}}=$ ……....	

8- Use a calculator to compute:

No.	Expressions	Answer	Generalization	Condition(s)
a	$3\sqrt{2}+5\sqrt{2}$			
b	$2\sqrt{3}-7\sqrt{2}$			
c	$3\sqrt{2}\times\left(-2\sqrt{5}\right)$			

Reminder:

Compute: $(3+5)^2=$......... $\left(3^2-2^2\right)^2=$.........

Calculate:

Values of a & b	$\sqrt{a^2+b^2}$	$\sqrt{a^2}+\sqrt{b^2}$	Compare: $\sqrt{a^2+b^2}$ & $\sqrt{a^2}+\sqrt{b^2}$
$a=1\&b=1$			
$a=5\&b=-4$			
$a=4\&b=5$			

What do you notice?…………………………………………………………………

Is it true that: $\sqrt{a\pm b}\le\sqrt{a}+\sqrt{b}$? ……………………………………………………

9- Find the term (factor), that if multiplied by the given term (factor) the radical will be eliminated:

No.	Term	Its conjugate	Product of the term by its conjugate
1	$\sqrt{2}$		2
2	$3\sqrt{5}$		15
3	$3\sqrt{2}-2\sqrt{3}$		$18-12$
4	$2\sqrt{5}+1$		$20-1$
5	$-\sqrt{2}-\sqrt{3}$		

10- Eliminate the radical from the denominator of: (Rationalize)

a. $\dfrac{3-\sqrt{2}}{\sqrt{5}}$

b. $\dfrac{1+\sqrt{5}}{1-\sqrt{5}}$

c. $\dfrac{3-2\sqrt{5}}{-1-\sqrt{5}}$

11- Given that: $a=7$

a. Frame (enclose) a between two consecutive squared numbers.

……………………………………………………………………

b. Deduce the encirclement of $\sqrt{a}$.

……………………………………………………………………

……………………………………………………………………

12- Let $b=1+3\sqrt{2}$

a. Bound $\sqrt{2}$ between two integers. Show your work.

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b. Deduce the bounding of b.

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