IN HIS NAME

The Islamic Institution for Education & Teaching Al-Mahdi Schools		Mathematics Department **Scholastic Year**: 2019-2020 **Date**: January 2020
Class: Grade 10		**Duration**: 150 minutes
Name: _____	**Answer Key Mid-year Exam**	**Mark**: 30 points

Questions		Answers	Note
I 3.5 pts	**1**	B ; $2 < \sqrt{x} < 3$	**0.75**
	2	C ; B(4, −11)	**1**
	3	B ; A < B	**0.75**
	4	B ; $x = -4$	**1**
II 4 pts	**A 1**	A= 5	**0.75**
	A 2	$B = 5\sqrt[3]{3^3 \times 2} - 3\sqrt[3]{(2)^3 \times 2} - \sqrt[3]{4^3 \times 2} = 5\sqrt[3]{2}$	**1**
	B	$S_1 : x \in [1,5]$; $S_2 : x \in] -\infty, 1[\cup [5, +\infty[$; $S_1 \cap S_2 = \{5\}$	**1 + 1+0.25**
III 4 pts	**1-a**	E = [−10 ; 10] C = [6 ; +∞[	**0.5+0.75**
	1-b	Representation	**0.5**
	2	D = {7}	**1**
	3	X may be [6 ; 10] or C or any interval subset of C	**0.5**
	4	Y = [m ; 6[with m ≤ −10	**0.75**
IV 5 pts	**1**	$3 < 2x - 1 < 9$; $\frac{1}{8} < \frac{1}{x+y} < \frac{1}{5}$ then ; $\frac{3}{8} < \frac{2x-1}{x+y} < \frac{9}{5}$ $4 < x^2 < 25$; $-25 < -x^2 < -4$; $-21 < -x^2 + 4 < 0$	**1.25 + 0.75**
	2	$-x^2 + 4 < 0$ then $B = |-x^2 + 4| = x^2 - 4$	**0.5**
	3	$E = 3\sqrt{2} - 4 - 3\sqrt{2} + 3 = -1$	**0.75**
	4-a	$|A| = 1 \Rightarrow A = 1$ or $A = -1$ but A is positive then $x = 4$ accepted	**1**
	4-b	$3B = -15$ is impossible since $B > 0$	**0.75**
V 3.5 pts	**1**	P(1) = 0 then m = 3	**1**
	2-a	By division or by identification then a = 2 , b = 7 and c = 3	**1.5**
	2-b	P(x) = 2(x + 3)(x − 1)(x − 0.5)	**1**
VI 10 pts	**A-1**	$3\overrightarrow{EB} - \overrightarrow{EA} = \vec{0}$, $3\overrightarrow{EA} + 3\overrightarrow{AB} - \overrightarrow{EA} = \vec{0}$, $\overrightarrow{AE} = \frac{3}{2}\overrightarrow{AB}$ $\overrightarrow{CF} + 2\overrightarrow{BF} = \vec{0}$, $\overrightarrow{CF} + 2\overrightarrow{BC} + 2\overrightarrow{CF} = \vec{0}$, $\overrightarrow{CF} = \frac{2}{3}\overrightarrow{CB}$	**0.75 + 0.75**
	A-2	Figure	**0.5**
	A-3	$\overrightarrow{DE} = \overrightarrow{DA} + \overrightarrow{AE} = -\overrightarrow{AD} + \frac{3}{2}\overrightarrow{AB}$ $\overrightarrow{DF} = \overrightarrow{DA} + \overrightarrow{AB} + \overrightarrow{BF} = \overrightarrow{AB} - \overrightarrow{AD} + \frac{1}{3}\overrightarrow{AD} = \overrightarrow{AB} - \frac{2}{3}\overrightarrow{AD}$	**0.75 + 1**
	A-4	$\overrightarrow{DE} = \frac{2}{3}\left(-\overrightarrow{AD} + \frac{3}{2}\overrightarrow{AB}\right) = \frac{2}{3}\overrightarrow{DE}$;	**0.75**
	A-5	$3\overrightarrow{IB} - \overrightarrow{IA} + 2\overrightarrow{IC} = \vec{0}$ (Introduce E) and $3\overrightarrow{EB} - \overrightarrow{EA} = \vec{0}$ then $2\overrightarrow{EI} = \overrightarrow{EC}$	**1**
	B-1	B(2 ; 0), C(2 ; 1), D(0 ; 1), O(1 ; 0.5), E(3 ; 0), F(2 ; $\frac{1}{3}$)	**1.5**
	B-2	E is the midpoint of [LC] then L(4 ; −1)	**0.5**
	B-3	$\overrightarrow{OB}$ (1; −0.5); $\overrightarrow{OL}$ (3; −1.5) then $\overrightarrow{OL} = 3\overrightarrow{OB}$ then O, B and L are collinear	**1**
	B-4	We verify thaty $\overrightarrow{BC} + \overrightarrow{BA} + \overrightarrow{BL} = \vec{0}$ where $\overrightarrow{BC}$ (0 ; 1), $\overrightarrow{BA}$ (−2 ; 0), $\overrightarrow{BL}$ (2 ; −1) then B is the center of triangle CAL.	**0.75**
	B-5	$\overrightarrow{AC} = \overrightarrow{ML}$ where $\overrightarrow{AC}$ (2 ; 1) and $\overrightarrow{ML}$ (4 − x ; −1 − y) then M(2 ; − 2)	**0.75**