13th International Junior Science Olympiad



THEORY COMPETITION

--- ANSWER SHEET ---

DECEMBER, 6th 2016



FILL IN THE FOLLOWING INFORMATION

FIRST NAME	
MIDDLE NAME	
LAST NAME	
COUNTRY	
CODE	
SIGNATURE	



PROBLEM I

	I.1 7	Γhe	нα	of	the	so	lution	is
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Points:	Answer:
1.5	

I.2 Calculate the content (in grams) of hydrogen and carbon in the sample.

Points:	Answer:
0.5	Hydrogen =
	Carbon =
	Curon

I.3 Determine the mass of the reaction flask with its contents after the reaction.

Points:	Answer:
0.5	
	Mass of the reaction flask with its contents after the reaction

I.4 Calculate the pH of the mixture

Points:	Answer:
1.0	
	pH of the mixture =

I.5 How many grams of the unreacted reactant remain

Points:	Answer:
1.5	
1.0	

I.6 Calculate the acid value of sample

Points:	Answer:
1.5	
	A '1 1 C 1
	Acid value of sample =

I.7 Fill in the box provided with numbers 1, 2, or 3 to show the order that you choose of the retardation factor (R_f) (from low to high).

Points: 1.0	Lauric acid
	Myristic acid
	Palmitic acid



I.8 Calculate the mass of methyl laurate formed

Points:	Answer:
1.5	711151101
1.3	
	Calculate the mass of methyl laurate formed =
	Calculate the mass of memy fautate formed –



I.9 Calculate the weight (in grams) of C₂H₃Cl that will be formed after the reaction is complete

Points: 1.0	Answer:
	The weight of $C_2H_3Cl =$
	DO NOT WRITE BELOW
Tota	al points for Problem I

PROBLEM II

II.1	Find	the total	pressure at	the de	pth of	20.0	meter	under	the sea	surface

Points:	Answer:
1.0	

II.2 Calculate the maximum time (in minutes) of his/her diving.

Points: 2.0	Answer:	Ì
2.0		l
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II.3a. [0.5] Choose the correct international unit for **R**-value.

No	Some international units				
1	$J m^2 K$				
2	$m^2 K s$				
3	S				
	$\overline{\text{J m}^2 \text{ K}}$				
4	J				
	$\overline{\mathrm{m}^2 \mathrm{K} \mathrm{s}}$				

II.3b. [1.0] Choose the best material for SCUBA suit.

No	Name of material (abbreviated)	R-value
1	A	1.0
2	С	3.7
3	G	4.5
4	N	5.5



II.4 What is the depth at which this pressure difference occurs?

Points:	Answer:
1.0	



II.5 Calculate his/her volume of the lungs at the depth of 30.0 m.

Points:	Answer:
1.0	



II.6 Find the value of b.

Po	oints:	Answer:
2.	.0	



II.7 What is the maximum angle between the refracted sunlight and the normal that the diver sees?

Points:	Answer:			
1.5				
DO NOT WRITE BELOW				
Т	otal points for Problem II			



PROBLEM III

Cross the correct answer on the box provided. Look for the letter that you think is the correct answer to the questions and then provide a cross on that letter below the number. *Example*: if you think that the correct answer for problem III.1 is V, then you cross the letter V below III.1.

			Que	stion:		
	III.1	III.2	III.3		III.5	III.6
	A	A	A		A	A
	В	В	В		В	В
	С	С	С		С	С
	D	D	D		D	D
	Е	E	Е		Е	Е
	F	F	F		F	F
	G	G	G		G	G
∞	Н	Н	Н		Н	Н
ANSWERS	I	I	I		I	I
\geq	J	J	J		J	J
\mathbf{Z}	K	K	K		K	K
\triangleleft	L	L	L		L	L
	N	N	N		N	N
	О	О	О		О	О
	P	P	P		P	P
	Q	Q	Q		Q	Q
	R	R	R		R	R
	S	S	S		S	S
	T	T	T		T	T
	U	U	U		U	U
	V	V	V		V	V
	117		337			337
	W	W	W		W	W
		· · · · · · · · · · · · · · · · · · ·	<u>-</u>			
	1.0	1.0	1.0		1.0	2.0

III.4 Point: 2.0

Calculate the percentage population in 2014 and 2015 relative to 2013, and construct a histogram using the calculated data.



III.7 [2.0 points] Determine the set of sex chromosomes of the Komodo dragon and mark the one correct genotype with a cross in the following table

Individual dragon	$Z^N Z^N$	$Z^N Z^n$	Z ⁿ Z ⁿ	Z ^N W	Z ⁿ W
1.1					
1.2					
2.1					
2.2					
2.3					
3.1					
3.3					

DO NOT WRITE BELOW	

Total points for Problem III