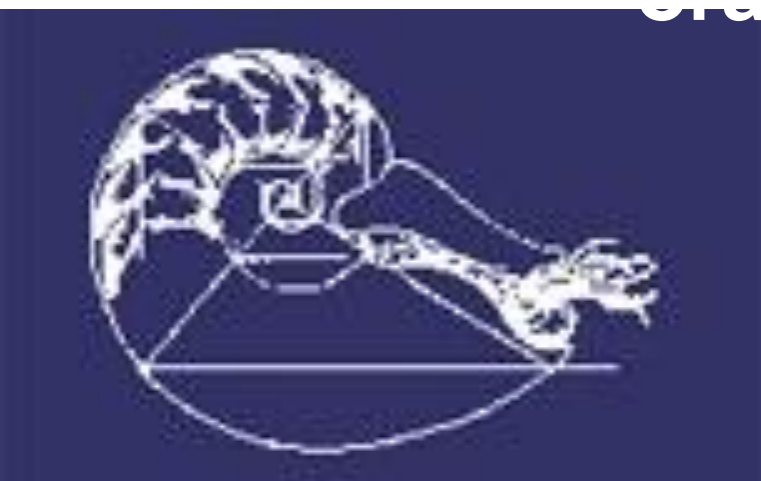


Model of ICT competence Assessment on oral math exam



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What are areas of my work?

- Mathematical consultant (for primary and secondary schools)
- Curriculum development and its implementing
- Introducing ICT (didactic)
- In-service teachers training
- International conference on learning and teaching mathematics KUPM 2014
<http://www.zrssi.si/kupm2014/>
- Member of the *Subject Testing Committee for the Vocational Matura for Math (STCVM)*

Outline

- Concept of vocational matura in Slovenia
- Model of math exam
- Situation-related questions (example)
- Methodology of evaluating
- Assessment (of ICT competence)

Post-compulsory education/upper secondary level

General upper secondary education (Gimnazija) 560 hours of math.	15-18 years of age (four years)
Technical upper secondary education 383-408 hours of math.	15-18 years of age (four years)
Short and medium length vocational upper secondary education 157-213 hours of math.	15-17 years of age
Vocational-technical upper secondary education	18-19 year of age (two years after completion of three-year vocational education)
Preparatory classes for the matura examination	19 or more (one year)
Vocational courses	19-20 year of age (one year)

Vocational matura

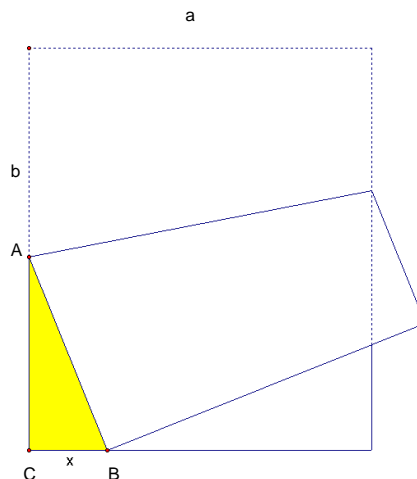
- Acces to professional types of higher education (vocational colleges and colleges but not university courses)
- After 4 year of professional education or 3+2 model (18 y or more) or...
- 4 subject (choice: foreign language or mathematics)
- 4.269 students took math in spring term 2013 (8960 all)

Math exam

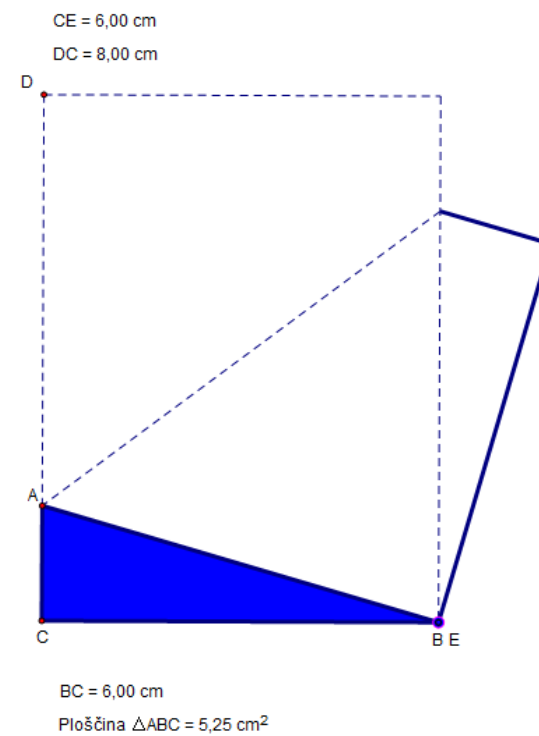
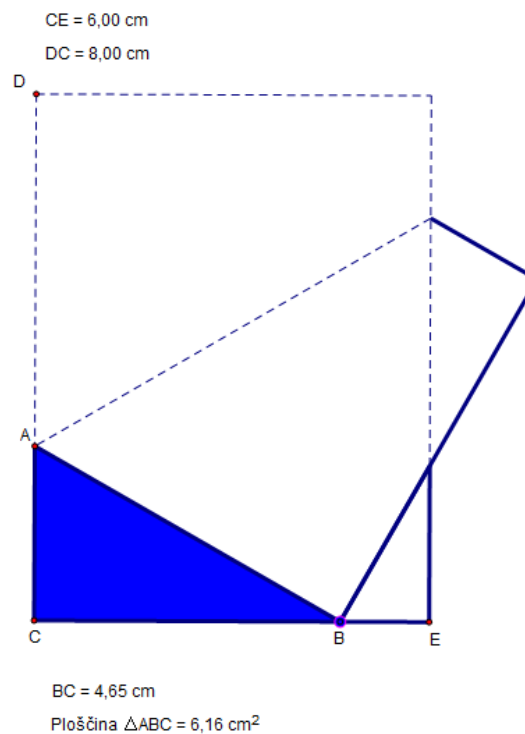
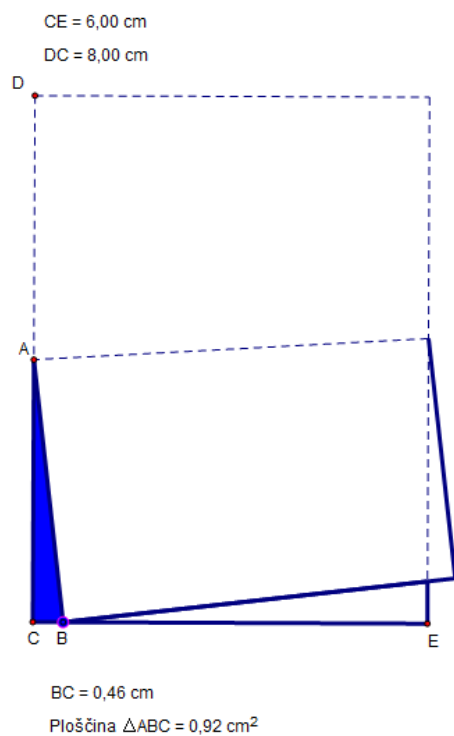
- Written part (70 points)
 - *Subject Testing Committee for the Vocational Matura for Math*
 - 9 shorter questions + 3 structured questions
 - Allowed: Scientific calculator
- Oral part (30 points)
 - Within schools (internal)
 - Situation and Situation-related questions (based on real life or profession: economy, engineering, electronic, medical, tourism, gastronomy, agriculture ...) since 2012
 - Allowed: computer or graphing calculator (used in the classroom)

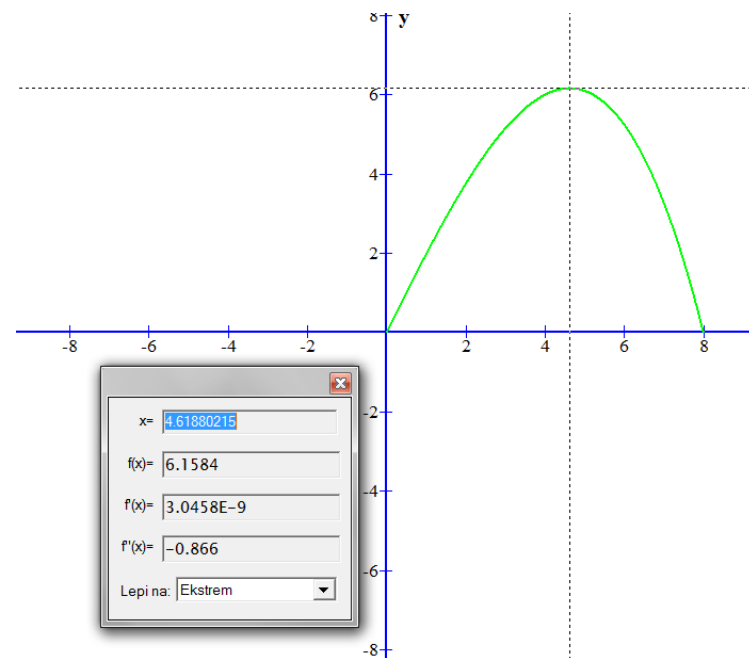
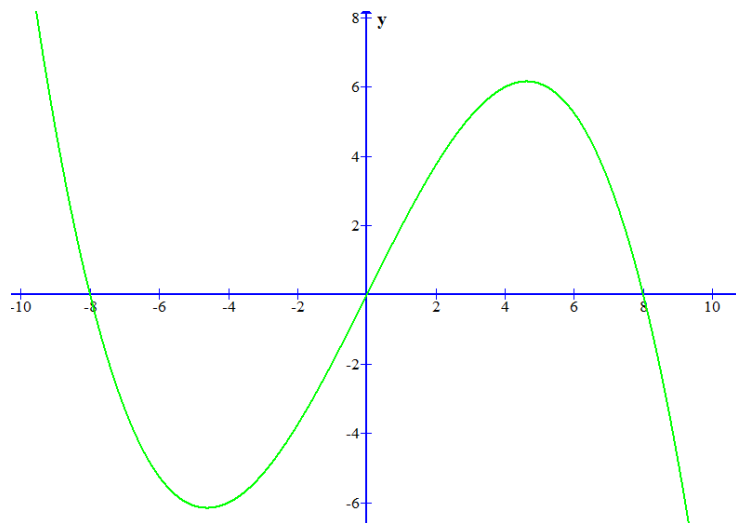
Example

Rectangular piece of paper with width 6 cm and length 8 cm is folded as shown.



1. Calculate the area of triangle for $x=4$ cm and $|AB|=5$ cm. Describe your work.
2. While point B is moving on a the area S of the marked triangle is changing as $S(x) = -\frac{x^3}{32} + 2x$. Draw the graph of function S and describe its properties.
1. Use derivative and determine the value of x where the area of marked triangle is maximum. Justify/explain your answer.





Methodology of evaluating Criteria (Magajna, 2008)

- The use of (appropriate) mathematical language in communication
- Linking situation with mathematical terms, procedures and concepts, transfer
- Choosing and implementing mathematical procedures
- Level of abstraction and systematicity, elements of deduction
- The use of ICT
- Explaining, reasoning (procedures, strategies, results)

Special evaluating scheme

(Magajna, 2008)

	1. question	points	2. question	points	3. question	points	Total
The use of (appropriate) mathematical language in communication							
Linking situation with mathematical terms, procedures and concepts, transfer							
Choosing and implementing mathematical procedures							
Explaining, reasoning (procedures, strategies, results)							
Level of abstraction and systematic, elements of deduction							
The use of ICT							
Total							



	1. question	points	2. question	points	3. question	points	Total
The use of (appropriate) mathematical language in communication							
Linking situation with mathematical terms, procedures and concepts, transfer							
Choosing and implementing mathematical procedures	10 points						
Explaining, reasoning (procedures, strategies, results)							
Level of abstraction and systematic, elements of deduction							
The use of ICT							
Total							

	1. question	points	2. question	points	3. question	points	Total
The use of (appropriate) mathematical language in communication	Terminology for describing rectangular triangle, Pythagorean theorem	2	Terminology for describing properties of polynomial	2	Terminology for derivative (max, min)	1	5
Linking situation with mathematical terms, procedures and concepts, transfer	Identify rectangular triangle in the situation of folding paper	1	Understanding of the situation Function (independent and depended variable, domain).	2	Linking the result with situation	2	5
Choosing and implementing mathematical procedures Explaining, reasoning (procedures, strategies, results)	Calculating IACI=3 cm and calculating the area of triangle $S=6 \text{ cm}^2$.	4	Calculation of zeros $x_1=0$, $x_2=8$, $x_3=-8$, intersection with y axis, graph. Properties (domain, codomain, increase/decrease, positive/negative).	5	Calculation of derivative and calculation of its zeros $x_{1,2} = \pm \frac{8\sqrt{3}}{3}$. Explain result.	5	14
Level of abstraction and systematic, elements of deduction	Formula for calculating the area of rectangular triangle is connected with the general formula for calculating the area of triangle.	1					1
The use of ICT		0	Drawing graph with ICT, reading zeros	3	Show/Calculate derivative and its zeros with ICT.	2	5
	Total	8		12		10	30

Challenges

- Teachers must know the characteristic of the program they teach in. Some are teaching in more than one program.
- Teachers have difficulties 'finding' suitable situations/questions (min 35).
- ICT in schools
- Impact/effect on instruction/math class
- Control
- No changes on general matura

Viri

- Letno poročilo PM
2013http://www.ric.si/poklicna_matura/statisticni_podatki/file:///C:/Users/MSuban/Downloads/Letno%20porocilo%20za%20poklicno%20maturo%202013%20CIP.pdf
- Suban Ambrož, M. Spremembe in novosti na poklicni maturi. Revija Matematika v šoli

Thank you for your attention!