

Visual Mathematics in Practice



Name of the teacher:	Radoslava Srđenović
Name and address of the school:	Tehnička škola „Ivan Sarić” Trg Lazara Nešića 9 24000 Subotica Serbia
Theme of the lesson:	Definite Integrals
Place in curriculum: (type of school, grade)	High school, 4 th grade
Age of the students/pupils:	18
Title of the lesson:	Definite Integrals and the Fundamental Theorem of Calculus

Description of the lesson			
Time	Exercises, matters, parts of the lesson	Methods and forms of student activities	Developable competencies
15 min.	<p><i>Example /Assignment:</i> Drawing a graph of $f(x) = \frac{x^2}{8}$ (using Geogebra) .</p> <p><i>How can we determine the precise area under a curve?</i></p> <p>Introducing upper and lower sums.</p> <p>Using upper and lower sums to approximate the area of a region formed between a function and the x-axis.</p> <p><i>Example /Assignment:</i> Have the students calculate upper and lower sums of $f(x) = \frac{x^2}{8}$ over the interval $[1,4]$ with a regular</p>	<p><i>Individual work</i></p> <p><i>Frontal instruction</i></p> <p><i>Individual work</i></p>	<p><i>Image creating skills</i></p> <p><i>Problem representation, looking for connections</i></p> <p><i>Problem solving</i></p>

<p>20 min.</p>	<p>partition of $n = 4$ subintervals .</p> <p>Definition of Riemann sum</p> <p><i>Example</i> Have the students calculate the Riemann sum of $f(x) = \frac{x^2}{8}$ over the interval $[1,4]$ with a regular partition of $n = 4$ subintervals and with chosen points $x_1 = 1.5$; $x_2 = 2$; $x_3 = 3$; $x_4 = 3.5$.</p>	<p><i>Frontal instruction</i></p> <p><i>Individual work</i></p>	<p><i>Problem solving</i></p>
<p>10 min.</p>	<p>Definition of the definite integral</p> <p>Properties of the definite integral</p> <p>Fundamental theorem of calculus</p> <p><i>Assignments:</i> Find the values of the integrals :</p> <ol style="list-style-type: none"> 1. $\int_0^5 dx,$ 2. $\int_1^2 (x^2 + 1)dx$ 3. $\int_1^4 \frac{x-1}{\sqrt{x}} dx$ 4. $\int_0^{\sqrt{3}} \frac{1}{1+x^2} dx$ 	<p>Frontal instruction</p> <p><i>Individual work</i></p>	<p><i>Generalization</i></p> <p><i>Recognizing relations</i></p> <p><i>Problem solving</i></p>

Summary

Inspiration came from workshop Mathematical Modeling with Geogebra by Đurđica Takači.

Having in mind the number of classes allotted to the topic of Integrals, we can't get into too much detail . Using Geogebra for showing upper and lower sums students could visualize approximation of the area of a region and understand how limit of Riemann sum is the area of a region. They were pleased that they could see how ~~stuff~~ definite integral works.

--

Supplements

Used materials:	<i>Projector, computer, Geogebra integralne_sume.ggb</i>
Photos:	