THE ROLE OF TECHNOLOGY IN IMPROVEMENT OF TESTING

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Abstract
In Mathematics, knowledge is tested by written exercises and oral questions. In its own way, each testing is used to measure the level of student's understanding of a particular topic Nowadays, the two ways of testing are clearly distingueshed by teachers as well as by students. Thus students prepare in two different ways: for oral testing they study mathematical facts whereas for written test they practice doing exercises. Both ways, however, often include little Mathematics, little learning by comprehension. The use of modern technologies can connect both ways of testing. What is more, it can provide a new quality. Exercises can be made that comprise theoretical knowledge and doing exercises that are realistic and connected with real life. We would like to show on examples how this is possible.

Hand – held technology is used in math classes to motivate students. A teacher can include the math - software into his/her lecture simply by using it as an electronic slide show.

Just teaching procedures of problems solving, almost never leeds to a good understanding. Instead, reflecting upon the meaning of certain steps in problem solving should be emphasized.

Arithmetic progression is a sequence that has a constant difference between each term and its direct predecessor. Formally we have $a_{n+1} – a_n = d$, for all n. From this simple recursive definition can students deduce the explicit formula for a_n in terms of n? However, the problem which a teacher is frequentally faced with is that many students have difficulties in manipulating and simplifying equations.

Problem 1: *Let K, L, M be the midpoints of the sides of an arbitrary triangle ABC. Show that the area of the triangle KLM is one quarter of the area of triangle ABC.*

We examine two solutions of the above problem. The first one is analytic, while the second is geometric one.

Analytic solution: Using formula for the area of a triangle in terms of its vertex coordinates.

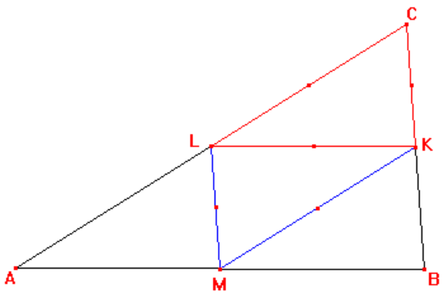
#1: InputMode := Word

#2: $$P(x1, y1, x2, y2, x3, y3) := \frac{1}{2}\cdot(x1\cdot(y2 - y3) + x2\cdot(y3 - y1) + x3\cdot(y1 - y2))$$

#3: $$4\cdot P\left(\frac{x1 + x2}{2}, \frac{y1 + y2}{2}, \frac{x2 + x3}{2}, \frac{y2 + y3}{2}, \frac{x1 + x3}{2}, \frac{y1 + y3}{2}\right)$$

#4: $$\frac{x1\cdot(y2 - y3) + x2\cdot(y3 - y1) + x3\cdot(y1 - y2)}{2}$$

Geometric solution: For the proof we have to symmetrize the triangle KLN accross the midpoints of its sides.



We can accomplish this symmetry-operation using Cabri Geometre.

Finally, we would like to show a more complex example using the dynamic geometry. Let‘s take an exercise from High-school book of exercises for the 1st class. ([4], p. 58)

Problem 2: *Construct a triangle, given the radius r of its inscribed circle, and given two of its angles α and β.*

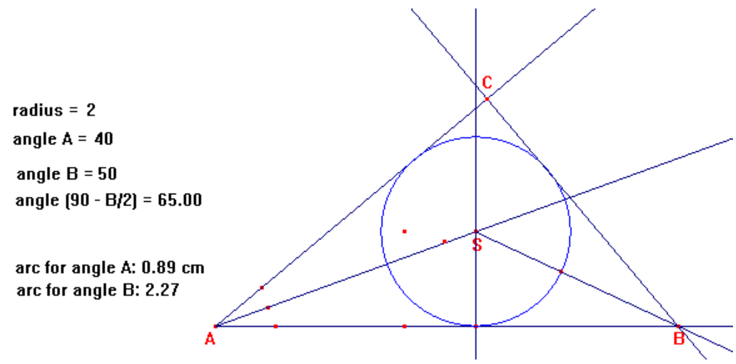
In order to solve the problem a student should know: (a) how to inscribe a circle to a triangle (b) the properties of an angle bisector (c) the properties of the tangent of a circle in a given point of a circle (d) how to construct a point satisfying certain condition (e) the reflection across the line and the properties of reflections (f) the properties of complementary angles in a right triangle

(a) they know that the incentre is the point of intersection of angle bisectors of a triangle (b) they know that the angle bisector devides the angle into two equal parts and that each point on the bisector of an angle is the same distance from each side of the angle (c) they construct a tangent of a circle at a given point of a circle (d) they define the point, which is the incenter they know how to reflect a point accross the line (e) they know how to apply the property of complementary angles (f) they know how to apply property of tangent segments

If we expect the student to solve the whole task, we must consider that it consists of seven elementary steps in which the student must use geometric facts and connect them into logical integrity.

When demonstrating how to solve the task the teacher can have technical problems when he is without proper tools. The students find it difficult to follow, they loose clear view and they are distra0cted from fundamental steps.

By using the programme of dynamic geometry teachers can show separate ele-ments of the solution. They also



base them because they do not deal with technical problems of constructi-on. In this way dynamic geometry helps the teacher to concentrate on fun-damental theme and mathematical elements. This task is suitable for the demonstration, the explanation, the use of individual geometric facts an as an example for solving other tasks. This analysis shows how examination is connected with teaching and how quickly wo loose our goal of examination by inadequate choice of the task. Tasks, which are used to check the know-ledge of mathematics today, do not anticipate the use of technology neither for teaching nor for problem solving. Therefore we shall moderate some exam-questions, while other tasks will stay unchanged despite the use of technology.

We can see already that there are some topics and procedures which become unnecessary and we are not teaching them any more. Some skills that students must know will be replaced by technology in the future.

Despite the appearance of new technologies the way of teaching mathematics remains more or less the same. Many exam-questions are much more easily solved with calculator than with pen and paper. We expect math classes to be more oriented into the use of modern CAS programmes and programmes of dynamic geometry. So, the choice of examming will follow this development.

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