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MULTIlingual Curriculum
for improving
KEY competences
through CLIL

Open all doors of education!



Privatna jezična gimnazija
Pitagora



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Zespół Szkół Elektronicznych
i Licealnych



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Privatna Gimnazija

Introduction

This set of materials, which is the result of two years of joint work of teachers from five European countries, has been prepared as a tool to help you start using CLIL in your own classroom. When we started preparing it, we all had at least one thing in common – a genuine interest to start implementing a foreign language, mainly English, into teaching content to our pupils. The teachers who contributed to this publication come from various backgrounds and have, just like our pupils, different abilities in foreign language – from B2 to C2 on CEFR scale.

We met a lot of obstacles during the project. So many differences in our educational systems that at a point it seemed like a mission impossible to find what could work with pupils of various language abilities who were being taught same contents at different ages. Nevertheless, we didn't give up and started finding similarities in our systems. After all, 2+2 has the same result in all corners of the globe, does it not?

The lessons prepared by teachers from schools involved in project Multikey are in History, Maths, Science, Art History and ICT. Some lessons have been adapted to Spanish, Catalan and Italian as a second language, but most of the content is in English, which has indeed become a *lingua franca* of modern world.

Why CLIL?

CLIL stands for Content and Language Integrated Learning. It has been hailed for some time in Europe as an approach to teaching that has an enormous potential. For example, the *Eurydice* report of 2006 stated that „CLIL methodological approach seeking to foster integrated learning of languages and other areas of curricular content is a fast developing phenomenon in Europe. Aware of this challenge, national policy makers are taking a greater interest in CLIL and offering a wide variety of initiatives consistent with the different circumstances facing them“. What we as teachers involved in a small mobility project funded through Erasmus wanted to investigate is how come, though everyone seems to be on the side of CLIL, it just doesn't seem to manage to put roots down in curricula around Europe.

So we decided to create something we feel would help us get started – a set of lessons that are in a way „suitable“ in any country in the EU, at least in those that were involved in our mobility project. The results of using our lessons in classroom surpassed our expectations. We honestly feel that these lessons will help you, just like they helped us, to get started with CLIL.

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Background

Six schools involved in the project met through e-twinning platform thanks to the fact that all had interest in working with Content and Language Integrated Learning. It turned out that most partners had some level of expertise in CLIL courses in their countries and others had a genuine interest in trialling the CLIL curriculum, particularly with disadvantaged learners and to continue to use the materials produced as an integral part of their own school curricula. The project was then applied to ERASMUS KA2 through *Croatian National Agency* (AMPEU) and received funding.

The purpose of the MULTilingual curriculum for improving KEY competences through CLIL (MultiKey) project was to explore and compare varying models of bilingual teaching that have developed in Europe and through reciprocal learning exchange ideas of best practices in various models of education. Multikey project was designed to address key competences which will help pupils gain skills needed to obtain a tertiary degree in education in line with the goals of *Europa 2020* strategy.

The project partners surveyed their national approaches to CLIL in order to identify key areas for development. Two most important outputs of the project are a comparative analyses/survey of CLIL in partner countries and teaching materials integrated in a single curriculum – MultiKey – which will be used in all partner schools. Based on the need to increase key competences in pupils' target group the partners will make appropriate adaptations and develop materials for use in all partner schools.

The project involved 29 teachers and 377 pupils in 6 partner schools who participated in activities related to the project. The project achieved the objectives of developing an innovative curriculum which was evaluated thoroughly before the completion of the project. The MultiKey curriculum is available to all secondary education institutions through project website (www.multikey.eu).

Survey on national approaches to CLIL in countries involved in the project

The purpose of the survey conducted by schools participating in the project MultiKey was to analyze and compare approaches to CLIL in countries involved in the project. The findings are based on the reports on national approaches to CLIL created by each school involved in the project. The purpose of each report was to find out answers to several questions that would give a comprehensive overview of each national approach. A general questionnaire was also created which helped schools get answers to specific questions about subjects most commonly taught, additional funding, CEFR level of CLIL teachers etc.

General information about CLIL in National Educational Systems (IT, ES, LV, HR, PO)

According to the definition provided in *Euridyce* report of 2012, CLIL provision (Type A) involves teaching non language subjects in at least two different languages. The only exception to that rule concerns teaching provision where all non-language subjects are taught in a language regarded as a foreign language by the curriculum, usually one of the major European languages (i.e. English, German or French, etc). This type of provision is also regarded as CLIL provision, although non-language subjects are taught in only one language. For the purpose of this report we are going to focus on ISCED LEVELS 2 & 3 which cover secondary schools involved in this project. As the survey shows, all countries involved have some sort of provisions regarding CLIL.

Data from *Euridyce* (2012) report shows that in Spain there are 948 schools that have some provisions 1 state language + 1 foreign language, In Poland 110 schools at ISCED levels 2 and 3 provide CLIL in ENGLISH, in Italy all students must learn one non-language subject through a foreign language in the last year of upper secondary education. There is no data for Latvia and *Euridyce* report lists only 3 schools in Croatia on ISCED 2 and 3 with CLIL provision.

For the purpose of this report project coordinators reported not just on schools that fall under the definition of CLIL provision, but also schools that have CLIL type courses even if they are taught only in one foreign language. For example, in Croatia, at least 13 schools have CLIL courses in English, but as only one language is used they are not included in *Euridyce* statistics.

In all countries involved in this survey some schools give students the opportunity to learn non-language subjects in two different languages, even if, like in Croatia, there are only several of them that can be said to provide CLIL by definition. In most of the countries providing CLIL there are no official recommendations/regulations for schools to use specific admissions criteria in order to select students for CLIL except in Poland where aptitude of students is tested. Although there are several languages used as target CLIL languages, English is used by all countries involved.

In Croatia and Latvia there are no formal additional requirements for teaching in CLIL, it is commonly expected that prospective CLIL teachers should provide evidence of their proficiency in the target foreign language. In both countries CLIL activities rely very much on enthusiasts. In Italy, since 2010, all students in the last year of upper secondary education have been obliged to learn one non-language subject through a foreign language. Those on the 'language' pathway, attending specific language schools, must do so from the age of 16. At the age of 17, students are taught a second non-language subject through the medium of a second foreign language from the three they are already learning.

Some additional qualifications required are:

- **ITALY:** One-year university course in CLIL (60 credits).
- **SPAIN:** Certificate and/or examination proving thorough knowledge of the target language. The minimum level required is usually B2 of CEFR, but there are some variations across the Autonomous Communities.
- **POLAND:** Certificate showing proficiency at a minimum of level B2 of CEFR (applies only to teachers who do not hold an academic degree in the target language). Regulations include a list of language certificates that are considered to be equal to level B2 of CEFR.

National reports

Italy

CLIL teaching was introduced by law (D.D. n.6/2012) in the Italian education system in 2012. Officially, the state project started in 2012 in secondary language schools with the introduction of CLIL practice in the 3rd grade and then extended progressively to the 4th and 5th-year classes over a period of three years (2012/2015).

According to the law, CLIL teaching had to be more gradually introduced in the so-called “*licée*” starting with the 5th-year classes, the final ones, only. This great novelty was therefore thought to be introduced as a common practice by 2015 when all schools had to offer one subject in a foreign language as part of the national curriculum, either totally or partially with a series of modules on different topics.

This project has forced schools to reconsider their pedagogy and teachers, students and families as well, to feel part of the change, if this change had to be a success and not a failure.

However, many surveys (the one conducted in the Erasmus project as well) have also identified its weaknesses, for instance the lack of attention for the feelings and needs of those required to work in the project and a considerable gap in the implementation of CLIL teaching between the North and the South of Italy.

Among the many doubts emerged in the survey, in particular from the teachers’ point of view, the most frequent are the following:

- Teachers do not feel appropriately competent in the foreign language required.
- In order to be taken on CLIL training courses, competent teachers must possess a language competence of level B1, at least. For them, the length of courses is four years. For teachers with C1 the length is two years.
- According to data collected by the Ministry of Education, in Lombardia the permanent teachers declaring a C2 level were 28, those with a C1 were 53 (out of a total of 1087), and in Campania, in the South, the permanent teachers declaring a C2 level were 27 and those with a C1 were 48 (out of a total of 1142).

- There is an evident discrepancy between the level of language competence self-assessed by teachers (and not tested) and the real competence required.
- Most Italian teachers are over 40 years old and this also means that the majority of them have never really studied a foreign language in a systematic way. Also the compulsory language exam in non-language degree courses often consists in an assessment with no final grade (just “passed” or “not passed”), which is not sufficient motivation to go on with deeper study of the language.
- Many courses were started to provide language competence (and the number was increased in 2016) but the number of teachers involved is very small.
- CLIL experience is being accepted only partially; only a third of schools have appointed the members of CLIL group and fewer have a training program for teachers, about CLIL methodology and experience.
- There is no additional funding for teachers who implement CLIL teaching on voluntary basis.
- The subjects involved are very often humanities or Art history, while scientific subjects are disregarded even in schools offering specialization in scientific subjects/matters.
- Our survey also showed that the difficult aspects of CLIL teaching, besides teachers’ language skills, are preparing, assessing and evaluating written texts for lectures while 63% of teachers find motivating pupils is relatively easy.

Many associations, expert in teaching and teaching methodology, are convinced that this must be a transitional phase in CLIL practice and that the real success of CLIL teaching will come only with the next generation of teachers, more familiar with languages, and the setting up of specific postgraduate courses.

■ Spain

In Spain CLIL teaching began in 2000. However, it was developed more seriously and with financial funding through program PELE in 2007 that afterwards was the origin of program PILE (2012) and, nowadays, of GED (2014).

Observing the survey's results and speaking in percentage, we find that 78% of the schools that were contacted are involved in a CLIL programme, in the primary or in the secondary schools. But, the teachers percentage engaged in activities is not so high. The maximum is 25% but, in the majority of cases it's fewer than 10%.

The survey showed that all 21 schools that participated thought a CLIL teaching program would improve teaching methodology in their school. The survey showed that majority of the teachers involved in CLIL activities are on a B2 level, but 75% of the teachers involved in the survey think that the desired levels are C1 and C2. 72 % of teachers think that students' ability in foreign language presents a problem in implementing CLIL while other aspects of CLIL teaching are generally not perceived difficult.

■ Croatia

There is no official CLIL program in Croatia however Article 8 of the Law on Education in Primary and Secondary Schools stipulates that the primary and secondary school part of the subjects and content of the established curriculum, except in the Croatian language, can be taught in one of the world's languages, with the approval of the Ministry and bilingual programs have been used since the early 1990s. However the number of schools actually using this option is very small.

It has to be noted that this is not a CLIL program in a true sense as there is no training for it and no clear methodology behind the project.

There is no additional funding for such activities but in some schools the program is paid by parents on monthly basis and the fees vary from app. 15-30 Euro. Also, in State schools one teaching

hour in bilingual class counts as 1.5 regular teaching hours.

In practice it means that secondary schools offer students the opportunity to attend part of the subject in one of the foreign languages – English, German or French.

Classes are held always starting from the Croatian language with the help of Croatian textbooks and books in a foreign language, but curriculum is the same as in other schools that teach in Croatian. Thus, students who attend the said program are taught the same material as everyone else, except that the content is presented in of the three languages.

This type of bilingual education could be considered CLIL education in broad sense, but as it is evident from the numbers – it is obvious that there is no real incentive for state schools to establish such a program as the Ministry does not financially support the schools involved the only option schools have is to transfer additional cost of the program to parents.

There are overall three vocational schools that have a bilingual program in Croatia, and all of them are from Varaždin county.

The principal from one of those schools, Strojarska i prometna škola Varaždin, Milan Žunar, explains that the schools had a problem in implementing the project due to the lack of funding. So although the schools have invested a lot of time and effort to start the project, it is not moving forward.

The survey conducted on 21 teachers involved in CLIL activities showed that 90% of them find teachers' language skill on the better side of the spectrum, which can be explained by the fact that many of the teachers involved in CLIL activities in Croatia are in fact language and subject teachers or have been trained abroad and have a high language competence. However, survey has also shown that most teachers find preparing lessons and texts difficult, as well as evaluating written texts done by pupils. The results of the survey can't really be held relevant because CLIL is used in a very small number of "elite" Croatian schools and is kept alive by enthusiasts working in those schools.

■ Poland

In Poland bilingual education has been conducted since 1991. Initially bilingual sections existed only in secondary schools, where grade “zero” was created and in which education was extended by one year. Currently there are schools with bilingual sections at all stages of education but primarily in lower secondary and secondary schools. In those institutions the second language of instruction is English, French, German, Spanish, Italian or Russian. The most popular is English, especially in lower secondary schools.

In accordance with the *The Act of the Education System*, in a bilingual class teaching is conducted in two languages: Polish and a foreign modern as the second language of instruction. Additionally, there should be a least two subjects taught in English, with the exception of Polish language and the part of history and geography involving Poland. Moreover, one of the subjects should be selected from the following: biology, chemistry, physics, mathematics, general geography or history.

Bilingual lessons are carried out by the teacher whose command of English is at B2 level or by the teacher of a foreign language who is additionally qualified to teach the non-language subject.

■ Latvia

There is no official CLIL program in Latvia according to the *Law of Education*. The implementation of CLIL in Latvian schools depends on school needs and can be used as optional choice for students.

In year 2010, agency introduced two new in-service teacher training programmes on Foreign Language and Content integrated learning methodology (programmes’ length 60 hours and 36 hours).

The target audience were teachers who wanted to teach their subject partly or fully in a foreign language. From 2011 to 2014 agency supported the organization of British Council courses on “CLIL Essentials” (programme length 50 hours). Lower and upper secondary school teachers were target audience of the teacher in-service programmes developed by the agency. British Council

programme didn't set any limits regarding the profile of teachers. There are 201 teachers in Latvia, who took part in these teacher in-service programmes for teaching CLIL from 2010 – 2013 offered by agency and British Council, but not all of them finished the program. There is no official data about number of schools or teachers in Latvia involved in CLIL activities. However, the questionnaire sent to Latvian schools showed that there are 7 schools with CLIL programs but all 20 schools participating answered positively to the question whether CLIL teaching program would improve teaching methodology in their school. Schools that do have CLIL programs find that the most difficult aspects of the program are finding suitable materials (57% of the teachers find it difficult) and preparing texts (60% find it difficult) as well as preparing lectures.

The easiest aspect is motivating students (63% of teachers find it easy). Delivering lectures and student and teacher language ability are not seen as a problem by teachers who were involved in the survey.

The overall comparative chart

	Italy	Spain	Croatia	Latvia	Poland
Is there a clear guidance by the Ministry how to implement CLIL?	yes	yes	no	no	yes
Is CLIL teaching supported by additional money from the ministries?	no	yes	no	no	yes
Which CEFR English level do teachers involved in CLIL activities typically have?	B2	B2	C1	B2	B2
What subjects are most common in CLIL activities?	History Art History	ICT PE Science Maths	History Maths	Science	Maths
Most frequently chosen foreign language in CLIL activities	English	English	English	English	English

SWOT analysis

As the primary objective of the project MultiKey is to create teaching materials that could be used by any secondary school in the EU SWOT analysis was created based on the comparison of reports by coordinators from countries involved in the project.

Strengths	Weaknesses	Opportunities	Threats
Similar curricula in all countries	No money to fund activities	There is some flexibility in each system to introduce CLIL activities	Pupil can view introduction of CLIL lessons as just another obligation
Genuine interest in CLIL method	Curriculum too stretched for additional activities		
Highly-skilled teachers	Work overload	CLIL is a buzz word in all countries involved	



Evaluation of quality of CLIL lessons in the project MultiKey

Students and teachers who participated in the project MultiKey throughout the project continuously evaluated the quality of CLIL lessons that teachers prepared. One of the goals of the project was to evaluate the project throughout its course, but we have collected this data also for the practical reason of choosing the best possible lessons for the final version of the curriculum.

At the beginning of the project, teachers tested their lessons themselves in class and perfected them after feedback from pupils.

Sometimes at the beginning of the second year of the project the team of teacher involved in the project created a quality assessment scale for CLIL lessons that has since been applied. After each tested CLIL-lesson the students evaluated the quality of lessons based on several factors: clarity and complexity, used attachments, their involvement and the development of language skills, as well as the usefulness of bilingual education for them personally (*Appendix 1* The scale for assessing the quality of CLIL lessons).

* (Clarity, complexity, activity, assessments, language, benefit, usefulness)

The collected data were further used in the assessment of lessons and deciding which lessons to keep and which to discard and which lessons need to be improved in order to meet the standards of quality.

Research Methodology

All teachers involved in the project were given a scale for assessing the quality of CLIL lessons which were given to students at the end of lesson.

The scale for assessing the quality of CLIL lessons

The scale includes questions about age and gender of students, grade in English language in the last school year, and two sets of questions. The first part included seven statements relating to individual elements of the lesson, and students assessed how much they agree with each statement on a scale of one to five. The second part included open questions, and it required of students to review the lessons and make suggestions for future work.

Indicate your agreement or disagreement with the following statements by circling your response using this scale

- 1 strongly disagree
- 2 disagree
- 3 neither agree nor disagree
- 4 agree
- 5 atrongly agree

1. The lesson was clear and easy for me to prepare.	1 2 3 4 5
2. The lesson was too complicated and inappropriate for my students.	1 2 3 4 5
3. The materials are sistematic and I didn't need any extra preparations for the lesson.	1 2 3 4 5
4. Handouts and assessments were very useful for me.	1 2 3 4 5
5. This lesson helped my students to learn new words and expressions in English.	1 2 3 4 5
6. In my opinion, students would benefit from more classes like this.	1 2 3 4 5
7. Lessons in English are very useful for students and their future education.	1 2 3 4 5

Figure 1 Agree/disagree statements for pupils

Results

17 lessons were chosen for evaluation purposes (about 20% of all lessons created in the project), and 256 pupils were involved in assessment (an average of 15 students per class). The lessons were chosen from all five subjects and were randomly selected.

In general, it was found that gender, the country of origin and grade in English language in the past year are not associated with the overall estimation of the lesson.

There is a moderate correlation between the age of pupils and statement relating to the benefit of more hours of bilingual education and its benefits in the future education, where students from higher grades assessed the usefulness higher on the scale compared to younger students, which is probably connected with the fact that as they get older students become more aware of the importance of knowledge from high school to further education or studying.

Although the lessons were chosen from a variety of subjects and fields, from History to Physics, the pupils, in general, evaluated lessons extremely positively. Lessons were generally given an average score of 4-5 according to different criteria, and those lessons that were evaluated as below score of 4 were either eliminated or upgraded. Especially useful was the information on the quality of handouts and tasks, because their finishing could significantly improve the quality of lessons. What could be further inferred from students' assessment is that the majority of teachers in preparing lessons really paid attention to the level of English language skills of pupils, as evaluations of the clarity and complexity of the lessons show that they were not difficult to follow.

A proof that CLIL could be a useful methodology in everyday teaching is that pupils in most lessons agree with the statement that they had learned new words and phrases in English language, as well as the fact that 54% of pupils agree with the statement that they would benefit from more CLIL classes, while 78% of pupils think bilingual education is very useful for them and their future education.

The comments we received in open questions were also very informative. Part of the students had suggestions for improvement of lessons: *"It could be useful adding some information about ... / I would dedicate more time to ..."* which were taken into account when lessons were finalised. However, more comments were just simple positive statements like *"We need more lessons like this./ I enjoyed today's lesson./ This lesson helped me to improve my English./ I wish that we could have more classes like this because it's more fun and we can learn new words. / This is good exercise to improve my skills and knowledge ..."* which were very encouraging for teachers and made us aware this methodology and all the effort teachers put into this project made sense.

Lessons that were not assessed by pupils were assessed by teachers in working groups in each subject area, so all lessons were evaluated. As there is a high correlation between the evaluation of teachers and pupils, the final selection of the lessons is the result of the overall evaluation, while the data collected from the pupils represents an additional criterion that increased the objectivity of decisions.

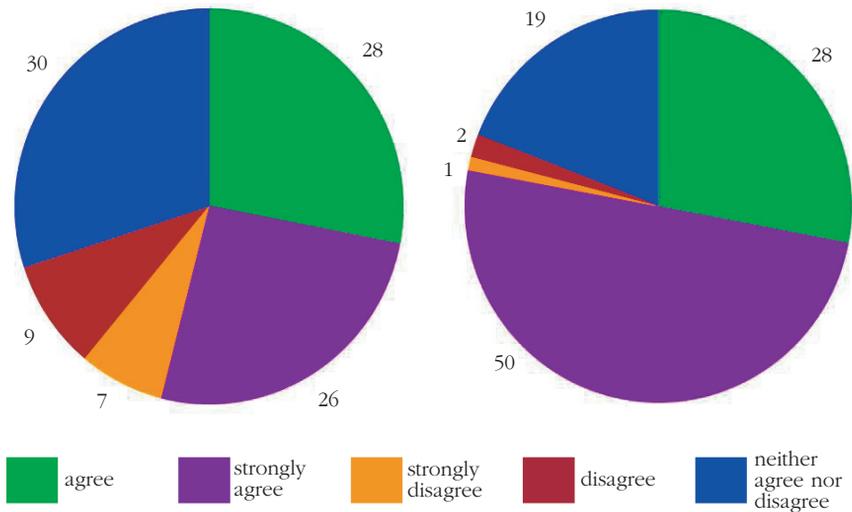


Figure 2
Responses of students to the statement: “In my opinion, I would benefit from more classes like this”.

Figure 3
Responses of students to statement “Lessons in English are very useful for me and my future education”.

Figure 2 shows that only 16% of students disagree with the statement that they would benefit more lectures involving CLIL methodology, while the high 54 percent of students agree or highly agree.

Figure 3 shows that only 3% of students disagree with the statement that bilingual classes are useful for them and their future education, while a high 50% of students highly agree and 28% agree with the above statement from which it is apparent that students recognize usefulness of these lectures.



How to use the lessons

Although the project MULTIKEY has resulted in numerous lessons, we have chosen those that we considered to be the most appropriate for use in all the countries involved in the project and we tried to unify the procedures so the lessons can be used by our fellow teachers without too much preparation time. The breakdown of the procedure is as following:

SUBJECT	Mathematics	The lesson plans were designed in order to facilitate the use of lessons in classroom. The initial part of each lesson plan defines the subject, topic, recommended age of students, language level and the timing of the lesson and the duration of the lesson.
TOPIC	Right triangle	
AGE OF STUDENTS	16	
LANGUAGE LEVEL	B1, B2	
TIME	45/60 min	

CONTENTS AIMS	
After completing the lesson, the student will be able to: Classify and compare different triangles. Interpret properties of triangles. Describe properties of right triangle. Explain what is hypotenuse. Recognize the use of right triangles in everyday life.	All the lessons distinguish language and content aims of the lesson.
LANGUAGE AIMS	
After completing the lesson, the student will be able to: Use new vocabulary within the topics. Interpret and communicate mathematics.	

PRE-REQUISITES	
Historical prequel: First World War. The political and economic situation in Europe and in USA in the Roaring Twenties	Lesson plans define the pre-requisites pupils need to have in order to be able to follow the lesson and the materials teachers need in the classroom
MATERIALS Tablet or pc Internet connection LIM	

PROCEDURE STEPS

1. Teacher verifies the pre-requisites: World War I, the political and economic situation in Europe and in USA, the Roaring Twenties age.

2. Then teacher starts with the short video (<https://www.youtube.com/watch?v=TCNKq0-9p3w&feature=related>) watching it twice, the second time with subtitles, and summarize the contents. Later the analysis is conducted using another video (<https://www.youtube.com/watch?v=VpKmfj5tUk&feature=rel>) whose students have to find the keywords.

Students listen and watch the videos, analyze the contents and answer to the question posed by teacher about the comprehension. Which are the causes of the Depression? Which are the effects of the Depression?

3. Teacher explains the deflation downward spiral, and how USA arrived to the 1929. Using a time line from 1926, when the stock-market begins its rise, to the fall down of real estate in Florida, to the 1933, with some data: unemployment rate, poverty line, annual per-capita income.

An example from the theater: the Lehman trilogy by Stefano Massini, put on stage by L. Ronconi, with the paradigmatic history of three brothers from Germany to Alabama and over. The new Great Recession of 2008 and Occupy Wall Street as a new evidence of the Wall Street power. The birth of Hoovervilles or Shanty town.

Each lesson comes with in-depth procedure steps for the teachers.

PROCEDURE STEPS

ATTACHMENT

Right triangle

r What types of triangles can you find in the figures?

A



B



C



D



Finally, each attachment is listed at the end of each lessons it can be prepared easily for use in the classroom.

All lessons can be downloaded from www.multikey.eu.

Contribute to the project: If you have lessons that might help other teachers in Europe feel free to contribute them to project Multikey. Learn more about it at www.multikey.eu



Multikey International team during first meeting in Warsaw

The project MultiKey was a result of a vision a group of teachers from a small secondary school in Croatia shared with their fellow teachers on e-twinning platform. What started as an exchange of ideas over e-mail soon became a huge international mobility project which changed our school forever and for the better. CLIL methodology made us rethink the entire vision of our school. The opportunity to exchange ideas with fellow teachers from across the EU has changed the way we act and think.

We hope the materials produced in this project will help other schools in adapting this methodology.

Dragan Šupe
PJK Pitagora

Work in Multikey project allowed us to expand and improve education. The teachers were co-authors of various educational materials and could learn innovative methods of teaching.

The students could develop their foreign language competencies through interacting with European teenagers. They could learn about different cultures and become aware of diversity of surrounding world. Undoubtedly, their motivation to learn foreign languages and build European Union community was boosted.

Anna Sułek
Zespół Szkół Elektronicznych i Licealnych

We are convinced that MultiKey has a great potential for creating a more positive attitude towards CLIL in our school and in all other schools and countries involved in the project.

The bilingual teaching during the project has spread on the other school subjects (as Physics, Biology, Mathematics etc.) and all the teachers and students have experienced really useful, interesting and interactive way of communication, of teaching and learning.

The students and the teachers are very satisfied with an unrepeatable educational and cultural experience.

Tomislav Franušić
Dubrovačka privatna gimnazija

The members of our Erasmus+ team from our school have created CLIL lessons in History, Opera, ICT and Science for this project, mostly in English language. Nevertheless, not only are we interested in teaching English, but in Spanish and Catalan as well. Thus you can also find some lesson plans adapted into Spanish and Catalan so that you can use them just as part of the CLIL methodology for learners of Spanish or Catalan as foreign languages.

We hope you enjoy teaching as much as your students do while learning in English, Catalan or Spanish.

Belinda Jiménez
Institut Ramon Berenguer IV

The project in general and the practical approach by producing lesson plans was a great challenge for us and let us find the most structured way to explain the idea of the content and to combine it with appropriate language competence. The materials are really good by their quality for beginners. Our partnership and produced materials have got good reviews in Latvian schools and local society. It was a good example of international and local cooperation on implementation of a good idea in practical school curricula.

Renāte Malnace
Daugavpils State Gymnasia

Our school has joined the project Erasmus+ Multikey with great enthusiasm and curiosity.

From the language point of view, the need of preparing lessons in English, with a common framework and common aims, has been a challenge for many of us. It has also given us our reward, of course. This project made some of us more familiar with CLIL methodology, enhancing the level of English used in classes and promoting a personal reflection about CLIL.

Our school also contributed with CLIL lessons in Italian as L2, conceived for students who are studying our language and are willing to approach Art and Science. Preparing CLIL lessons for students who are learning Italian has forced us not to take Italian for granted: in the effort to make these lessons effective, we have tried to make students work in particular on vocabulary and the wonderful variety and richness it offers, together with the development of their reading skills.

Raffaella Bianchi
Liceo Scientifico “Edoardo Amaldi”

LESSON PLAN

SUBJECT	Mathematics
TOPIC	Right triangle
AGE OF STUDENTS	16
LANGUAGE LEVEL	B1, B2
TIME	45 min

CONTENTS AIMS

After completing the lesson, the student will be able to:

- Classify and compare different triangles.
- Interpret properties of triangles.
- Describe properties of right triangle.
- Explain what is hypotenuse.
- Recognize the use of right triangles in everyday life.

LANGUAGE AIMS

After completing the lesson, the student will be able to:

- Use new vocabulary within the topics.
- Interpret and communicate mathematics.

PRE-REQUISITES

Types of triangles
Right triangle

KEY WORDS

Right triangle, right angle, leg (opposite, adjacent), hypotenuse, projection to hypotenuse, height, similar triangles.

MATERIALS

Worksheet “Right triangle”.

PROCEDURE STEPS

- 1 Students do the exercise 1 in pairs.
- 2 Students read, compare and explain their point of view.
- 3 Students complete the sentences in the exercise 2 in pairs.
- 4 Students read, compare and explain their point of view.
- 5 Students match in the exercises 3 and 4 in pairs.
- 6 Students discuss their results.
- 7 Students do the exercise 5 in pairs.
- 8 Students compare and explain their point of view. Mathematical relations are:

$$h_c = \frac{ab}{c} ; h_c^2 = a_c \cdot b_c ; a^2 = c \cdot a_c ; b^2 = c \cdot b_c ; \frac{a^2}{b^2} = \frac{a_c}{b_c}$$

ATTACHMENT

Right triangle

1 What types of triangles can you find in the figures?

A



B



C



D



E



F



2 Fill in the gaps!

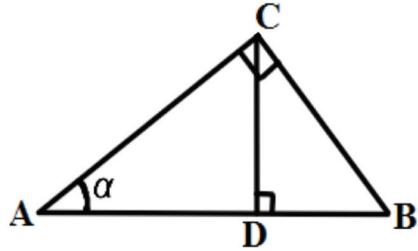
- A A triangle where one of its interior angles is a _____ angle (90 degrees) is called a right triangle.
- B The side opposite the right angle is called a _____.
- C Hypotenuse will always be the _____ side of a right triangle.
- D The two sides that are not the hypotenuse are called _____.
- E They are the two sides making up the _____ angle.
- F A right triangle can also be _____ if the two legs are equal in length.
- G The leg opposite to 30 degrees angle is a _____ of the hypotenuse in length.
- H The sum of the squares of the lengths of the legs _____ the square of the length of the _____.

3 Match the notion and its description or definition!

- | | |
|--|---|
| 1 ___ Pythagorean triangle. | A Drawing the height to the hypotenuse you get two line segments of the hypotenuse. |
| 2 ___ Projections of the legs to the hypotenuse. | B Ratio of lengths of an acute angle's opposite leg over the adjacent leg. |
| 3 ___ The sine of an acute angle. | C The name of a right triangle if the length of all three sides of it are integers. Its side lengths are collectively known as a Pythagorean triple. (3, 4, 5 or 5, 12, 13 etc.). |
| 4 ___ The tangent of an acute angle. | D Ratio of lengths of an acute angle's opposite leg over the hypotenuse. |
-

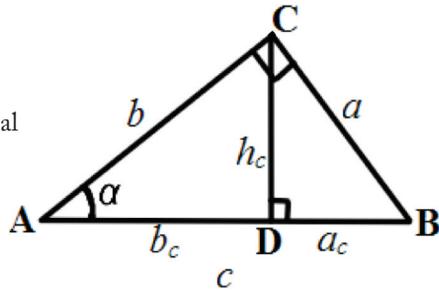
4 Match the following terms and elements from the given figure:

-
- ___ Hypotenuse
 - ___ Opposite leg to angle α
 - ___ Adjacent leg to angle α
 - ___ Height
 - ___ Projection of the opposite leg to the hypotenuse
 - ___ Projection of the adjacent leg to the hypotenuse
-



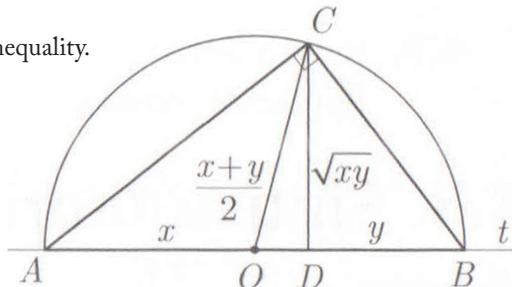
5 How many right triangles can you find in the figure?

- A Can you find similar triangles there?
- B How many pairs? Why are they similar?
- C What conclusions about mathematical relations among a, b, c, ac, bc, hc can be drawn?



Hometask

Using right triangle prove the inequality.



Right triangle (answers)

1 What types of triangles can you find in the figures?

A Isosceles obtuse triangle



B Regular (equilateral) tr.



C Isosceles right triangles



D Scalene obtuse triangles



E Isosceles right triangle



F Isosceles obtuse triangle



2 Fill in the gaps!

- A A triangle where one of its interior angles is a **right** angle (90 degrees) is called a right triangle.
- B The side opposite the right angle is called a **hypotenuse**.
- C Hypotenuse will always be the **longest** side of a right triangle.
- D The two sides that are not the hypotenuse are called **legs**.
- E They are the two sides making up the **right** angle.
- F A right triangle can also be **isosceles** if the two legs are equal in length.
- G The leg opposite to 30 degrees angle is a **half** of the hypotenuse in length.
- H The sum of the squares of the lengths of the legs **equals** the square of the length of the **hypotenuse**.

3 Match the notion and its description or definition!

1 - C 2 - A 3 - D 4 - B

4 Match the following terms and elements from the given figure:

- AB Hypotenuse
- BC Opposite leg to angle α
- AC Adjacent leg to angle α
- CD Height
- BD Projection of the opposite leg to the hypotenuse
- AD Projection of the adjacent leg to the hypotenuse

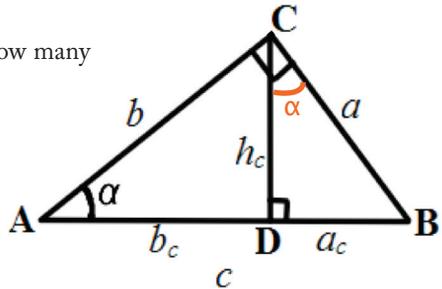
5 Answer the following questions:

A How many right triangles can you find in the figure?

I can find three right triangles there

B Can you find similar triangles there? How many pairs? Why are they similar?

3 pairs: $\triangle ACD \sim \triangle CBD$
 $\triangle ACD \sim \triangle ABC$
 $\triangle CBD \sim \triangle BAC$
 according to similarity test AA



C What conclusions about mathematical relations among a , b , c , a_c , b_c , h_c can be drawn?

$$\frac{AD}{CD} = \frac{CD}{BD} \Leftrightarrow CD^2 = AD \cdot BD \quad \text{or} \quad h_c^2 = a_c \cdot b_c$$

$$\frac{AC}{AB} = \frac{AD}{AC} \Leftrightarrow AC^2 = AD \cdot AB \quad \text{or} \quad b^2 = b_c \cdot c \quad \text{or} \quad a^2 = a_c \cdot c$$

$$c = \frac{b^2}{b_c} = \frac{a^2}{a_c} \Leftrightarrow \frac{b^2}{b_c} = \frac{a^2}{a_c}$$

$$S = \frac{ab}{2} = \frac{ch_c}{2} \Leftrightarrow h_c = \frac{ab}{c}$$



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