

Europeana Learning Scenario

Title

Pythagorean Theorem

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Abstract

This Learning Scenario will introduce students to one of the most important theorems of mathematics – the Pythagorean Theorem. This is one of the fundamental rules of geometry and basis for practical applications like constructing stable buildings and triangulating GPS coordinates.

Keywords

Mathematics, Geometry, Pythagorean theorem, Triangle, Right triangle

Table of summary

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Subject	Mathematics
Topic	Pythagorean theorem
Age of students	14 - 15
Preparation time	30 minutes
Teaching time	90 minutes
Online teaching material	<p>How many ways are there to prove the Pythagorean theorem? - Betty Fei How many ways</p> <p>Intro to Pythagorean theorem The Pythagorean Theorem</p> <p>Pythagorean theorem intro problems Pythagorean theorem intro problems</p> <p>Use Pythagorean theorem to find area of an isosceles triangle Area of an isosceles triangle</p> <p>Use area of squares to visualize Pythagorean theorem Use area of squares to visualize Pythagorean theorem</p> <p>Proofs of The Pythagorean Theorem</p>

	118 approaches to proving the theorem
Offline teaching material	Teachers have some offline materials if the online communication interrupt during the lesson.
Europeana resources used	Pythagora buste Pythagora portrait Pythagora biography

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Integration into the curriculum

This lesson is a part of Mathematics curriculum in the 8th grade.

Aim of the lesson

Students will be introduced to the Pythagorean Theorem. They will know how to use it to find the unknown side of a right triangle.

Outcome of the lesson

Students will be able to express the Pythagorean Theorem, use it for solving some problems such as finding the unknown side of a right triangle and prove the Theorem in many ways.

Trends

Collaborative Learning, Critical Thinking and Problem Solving

21st century skills

1. Critical Thinking and Problem Solving: Students will apply the Pythagorean Theorem to solve some problems and critical think about the solutions they find. Students will critically examine and explain different proofs of the Pythagorean Theorem.
2. Communication: Students will communicate in group and explain the results of their activity in front of other groups.
3. Collaboration: Students work together in groups and exchanged their ideas.
4. Information literacy: Students learn which websites are reliable to find information about the Pythagorean Theorem and many ways how to prove it.

5. Further skills: ICT, media literacy, learning by doing, communication, digital skills, literacy, basic skills in mathematics and science, learning to learn, cultural awareness.

Activities		
Name of activity	Procedure	Time
Engage students and Introduction to The Pythagorean Theorem	After a short teacher introduction about who Pythagoras was and his theorem, students watch the Intro to Pythagorean Theorem of The Khan Academy. In a short conversation with his students after the video, the teacher give some suggestions on how to apply what they see in the future.	15'
Brainstorming	Using their own devices (smartphones or tablets) students solve some practice problems online. Pythagorean Theorem In a short discussion after this activity, students comment the way they solve the problems.	10'
Proofs of the Pythagorean Theorem	Watching a short video from Ted-Ed How many ways are there to prove , students are introduced to many ways the Pythagorean Theorem was proved by famous mathematicians, scientist and some other famous people. The teacher introduces the students to some sources on the Internet where they can find many proofs of the Theorem like 118 approaches to proving the theorem .	10'
The Pythagorean Theorem and Europeana resources	The teacher also engages students to find some resources about Pythagoras and his famous theorem in Europeana Collections portal here . The teacher shows students some resources: Pythagora buste , Pythagora portrait , Pythagora buste2 , The golden verses of Pythagoras - monograph , Pythagora biography .	10'
Group work activities	Students are divided in groups of 4 students. Every group chooses their team leader and every member of the group has some task to do and participate in a final presentation of their group work. Every group has to: - make a practice problem for other groups to solve and find an unknown side of the right triangle - find a resource about the Pythagorean Theorem in Europeana Collections or other sites from the Internet and present it to other groups - find at least two proofs of the Pythagorean Theorem and present them to other groups	20'
Sharing ideas and presentation of the group work	Group after group, students will present their work to other groups. After the presentations, teacher will discuss with students about the work they made.	15'

Name of activity	Procedure	Time
Assessment	Using their own devices, students will assess what they have learnt in this lesson solving a short quiz. Use area of squares to visualize Pythagorean theorem	5'
Review and Feedback	The teacher holds a short discussion with his students, comments their work and tries to obtain some feedback from his students.	5'

Assessment

Students will be assessed for:

- solving 2 online quizzes during the lesson
- presentation skills after the work in the group
- answering the teacher questions during the presentation

Student feedback

In conversation with my students I see that they enjoyed the lesson and the way in which they were introduced to the Pythagorean Theorem.

Teacher's remarks

I am satisfied after the lesson because my students learnt and enjoyed the lesson.

About the Europeana DSI-4 project

[Europeana](#) is Europe's digital platform for cultural heritage, providing free online access to over 53 million digitised items drawn from Europe's museums, archives, libraries and galleries. The Europeana DSI-4 project continues the work of the previous three Europeana Digital Service Infrastructures (DSIs). It is the fourth iteration with a proven record of accomplishment in creating access, interoperability, visibility and use of European cultural heritage in the five target markets outlined: European Citizens, Education, Research, Creative Industries and Cultural Heritage Institutions.

[European Schoolnet](#) (EUN) is the network of 34 European Ministries of Education, based in Brussels. As a not-for-profit organisation, EUN aims to bring innovation in teaching and learning to its key stakeholders: Ministries of Education, schools, teachers, researchers, and industry partners. European Schoolnet's task in the Europeana DSI-4 project is to continue and expand the Europeana Education Community.

Annex

To organize this lesson in better way I used some online materials from other sources like Ted-Ed lessons, Khan Academy Lessons and Cut the knot:

- *How many ways are there to prove the Pythagorean theorem?* - Betty Fei

[How many ways](#)

- *Intro to Pythagorean theorem*

[The Pythagorean theorem](#)

-*Pythagorean theorem intro problems*

[Pythagorean theorem](#)

-*Use Pythagorean theorem to find area of an isosceles triangle*

[Area of an isosceles triangle](#)

-*Use area of squares to visualize Pythagorean theorem*

[Use area of squares to visualize Pythagorean theorem](#)

-*Proofs of The Pythagorean Theorem*

[118 approaches to proving the theorem](#)