Empowering innovation in TE(A)M
through IP awareness
2020-1-UK01-KA201-078934

Intellectual Output 1

A3 Course definition & Training methodology
LESSON PLAN TEMPLATE

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1.   Patents and Mathematics.

1.1   General Information

Mathematics is a discipline almost as old as mankind itself. However, advances in research, big data and data analysis using algorithms mean that our needs are gradually changing. As a result of this completely natural evolution for society, many changes are proposed, such as, for example, the link between patents and some methods of this discipline.

1.1.1 Brief description

This Lesson Plan aims to raise awareness of the importance of patents and to learn about the unusual relationship between mathematics and patents. By completing this lesson plan, you will be able to understand the links between these two disciplines and learn how to implement this knowledge through the following activities.

1.1.2 Learning objectives and IP topics

The learning objectives of this lesson plan are as follows:
- To understand the basic theory of intellectual property.
- To learn what is the function of patents.
- How this part of intellectual property can be applied to mathematics, as well as to implement critical thinking about whether such implementation is the most appropriate.

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1.1.3 Links to curriculum

This instructional exercise can motivate youngsters actively investigate and examine current technology breakthroughs and uses, with a focus on Mathematics. It improves cognitive (thinking) and affective (social/emotional) learning and is related to:

- Science
- Technology
- Arts
- Mathematics

1.1.4 Duration

The estimated time to complete this lesson plan will be approximately two hours, in a classroom of 20-25 students.

1.1.5 Extra materials required

To carry out this lesson plan, you will not need any extra materials in addition to those you would normally find in a normal classroom. The use of a screen and a projector will be necessary to use presentations to explain the content and activities.

1.2 Step-by-step instructions

First, in order to have defined activities, the class will be divided into groups of 5 people. The composition of the groups is fundamental for the development of the activities. The teacher must create the groups, which will carry out **three activities** related to critical thinking, the fundamental bases of **intellectual property**, the use of **patents** in our days and its application, in this case, to **mathematics**.

Once the three activities have been completed, a whole class discussion will take place to engage students in reasoning and most importantly, to enhance their learning about this topic.

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1.2.1 Introduction or orientation

In this Lesson Plan, three activities will be carried out on the chosen topic, which aim to:

- To develop critical thinking skills among the students.

- To argue about whether mathematics should or should not be patented.

- To take advice from experts in mathematics.

- To learn about the limits of intellectual property and patents.

The three questions to be discussed in groups of 5 students will be as follows:

a) <u>Do we use patents in our daily lives?</u> In this question, students should reflect on whether they are aware of elements in their daily lives that are patented. This helps them to associate patents with everyday things and to learn more about this main topic.
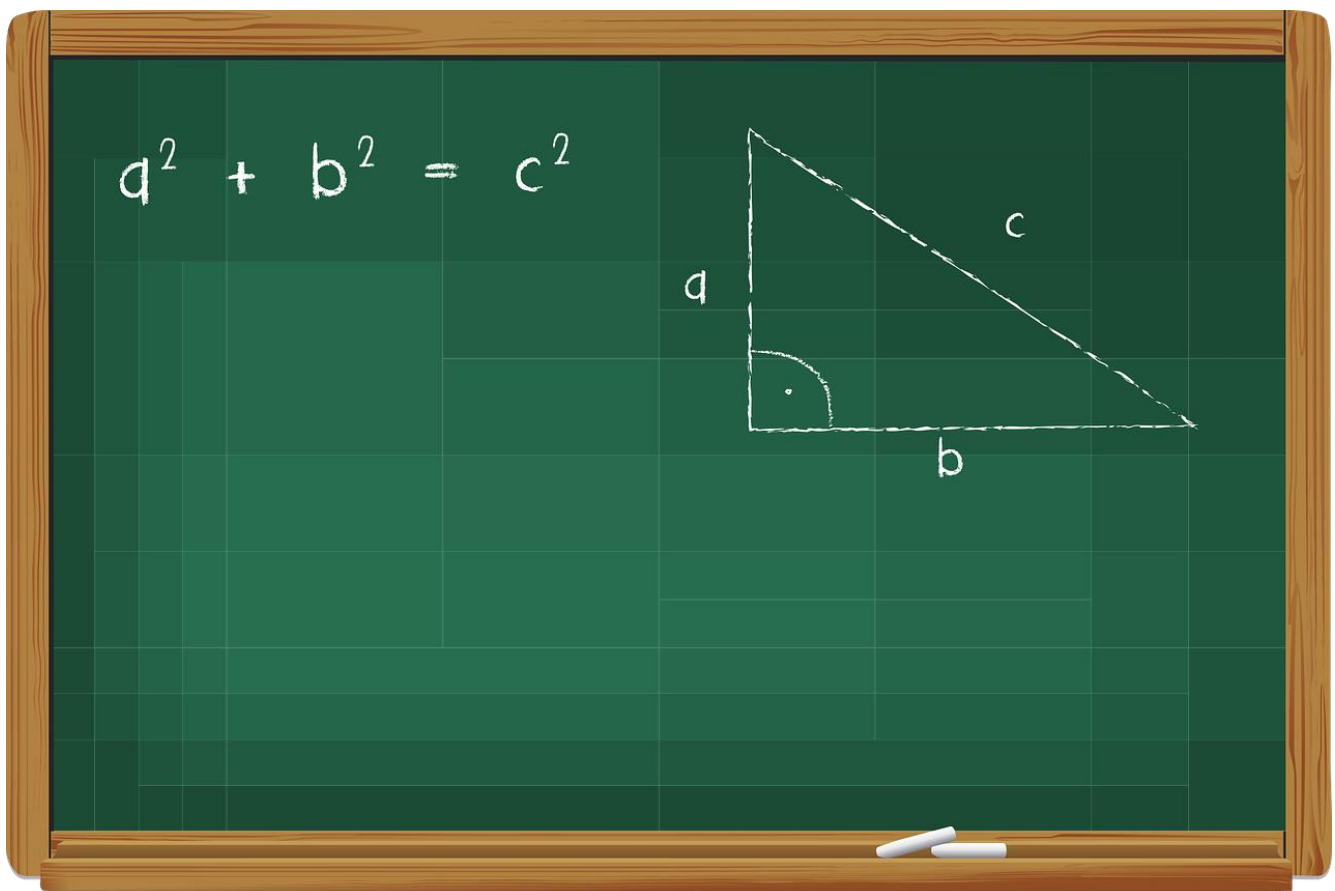
b) <u>Do you think mathematics should be patentable in the future?</u> Depending on the context of patents, students will have to try to come up with concepts in mathematics that could be patentable in the future.

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c) Since this is a mathematics class, <u>do students think that there will be elements of mathematics or algorithms that could be affected by patents?</u> By asking this question, students will activate their critical thinking and will be able to develop hypotheses about this topic.

1.2.2 Preparation or conceptualization

To prepare for this activity there will be two main topics related to mathematics. In this phase, students will have to warm up their critical thinking with the two topics presented below.

The first topic will be about the Pythagorean theorem.

Source: pixabay.com

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- The students, divided into groups of 5, should consider the possible scenarios that could arise if the Pythagorean theorem were to be patented. The students will have to elaborate at least 3 assumptions about this topic.

Secondly, they will be told about the case of the pi number patent in the module of this project.

- Students will be asked to reflect on how this might affect their daily lives if this patent were to remain in force. It will be necessary to refresh their knowledge from the relevant module to be able to explain to them what happened with this US patent.

1.2.3 Investigation

During this phase:

1. Students should do some individual research on the concepts of patents, pi number and and Pythagorean theorem.

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2. The teacher will divide the students into groups of 5. It is also possible for the students to agree among themselves to divide themselves into the different groups.

3. Once you have split up, you will have to focus on the three general questions in section 1.2.1 and come to common conclusions on the two proposed themes. One is the relationship between patents and pi number and the other is about the Pythagorean theorem.

Against this background, we propose the following two scenarios:

3.1. Let's suppose that, as of today, the Pythagorean theorem is patented, and to use it every day, both in design and in any discipline related to mathematics, the patent must be paid for. What do you think about it?

3.2. Now, let's make the assumption that the number pi is patented. If this were to happen, what would be the real-life consequences for students?

4. After discussing the above scenarios, the students will have to answer the three initial questions and argue their answers in front of their classmates. At this stage, they should prepare a couple of slides to make their presentation more complete.

5. Once all the presentations of the classmates have been completed, a class discussion will be opened in which they will have to put all their ideas on the table. Afterwards, they will have to come up with a common idea or solution for each of the two scenarios proposed.

1.2.4 Conclusion

The aim of this activity is that through patents and mathematics, students can learn more about the real world, implement creativity, make this subject more enjoyable and above all, use critical thinking and healthy debate to reach conclusions.

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1.3   Key questions for knowledge testing

The lesson plan can be accompanied by a short quiz of about five key questions that can be used to check the learners' knowledge acquisition. Correct answers in multiple choice questions can be marked in bold.

Question 1: Copyright belongs to intellectual property
[True] [False]

Question 2: Attempts have been made to patent elements of mathematics in the EU.
[True] **[False]**

Question 3: Why can't theorems or mathematical formulae be patented?
[Because the Berne Convention does not allow it]

[Because EU law does not give it as valid]

[Both answers above are correct]

Question 4: Patents and trademarks are divided into categories according to their use or design.
[True] [False]

Question 5: You can only patent mathematics but only if the mathematics contributes to a technical solution to a technical problem.
[True] [False]

1.4   References or additional resources

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