Pythagoras and the Leaning Tower of Pisa

Age group/class: 15 – 16 years old

Lesson title: Pythagoras and the Leaning Tower of Pisa

School Discipline: Math

Key concepts: types of angles, Pythagorean Theorem

Aims:

- Apply Math concepts to a worldwide famous historical monument
- Illustrate that Math is a vivid subject, which is around us more than what we could expect

Skills developed: observation, analysis and research

Materials/Equipment needed:

- https://www.ted.com/talks/alex_gendler_why_doesn_t_the_leaning_tower_of_pisa_fall_over/transcript#t-288496 *(to be used in the introduction activity to provide some basic information about the Leaning Tower of Pisa)*
- https://eloquent-ramanujan-887aa5.netlify.app/math.html
  (to be used for the practical VR experience)
- VR headset
- VR video / link
- https://www.youtube.com/watch?v=kwi_IuQUjkk *(to be used for the formative assessment)*

Lesson plan:

Stages	Description of activity	Time
Preparation before the lesson	If this is a first VR experience for students – go through the safety rules: – Learners are to sit down whilst using the VR glasses and not hold anything in their hands, unless the experience is of such a nature that it requires you standing, in which case, ensure enough space is allowed around all students. – Learners will be told to expect a feeling of vertigo. If it gets worse, students must remove VR glasses. – Learners need to know how to adjust the viewing focus before using the headsets. – Learners must not use the headset when they are: tired, need sleep, under emotional stress or anxiety, when suffering from cold, flu, headaches, migraines as this can worsen their susceptibility to adverse reactions. – Learners should be given the choice to opt out of using VR.	
Introduction	Share Learning Intentions with students The aim of the current lesson plan is to apply Math concepts to a worldwide famous historical monument, showing how this subject is	10 min.

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	around us more than what we could expect. The starting point is to provide students with basic information about the Leaning Tower of Pisa through the use of a video	
Initial Immersive Experience	"And now let's go to Pisa": https://eloquent-ramanujan-887aa5.netlify.app/math.html Learners put on the VR headsets and explore the video at their own pace for about 10 minutes.	10 min.
Guided Immersive Experience	Teacher asks students to watch again the VR resource, focusing on the Math concepts which are developed: types of angles, Pythagorean Theorem. Then, both the Math concepts are in-depth explained by the teacher.	20 min.
Follow up	1) Group work Students, divided into groups, are asked to identify further historical monuments which can be studied from a mathematical point of view, putting into practice their recent knowledge on the types of angles and on the Pythagorean Theorem. 2) Math applied to historical monuments Teachers asks students to analyse some historical monuments from a Math perspective: Chichén Itzá  https://mathedconcepts.wordpress.com/2012/06/06/chichen-itza-a-mathematical-enlightenment/	20 min.

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	Stonehenge  https://www.sciencealert.com/pythagoras-triangle-used-construction-stonehenge Pyramids  https://pythagoreantheorem-pyramids.tumblr.com/	
Formative Assessment	"Now let's go back to the Leaning Tower of Pisa, and let's solve the problem of identifying its lean": https://www.youtube.com/watch?v=kwi_IuQUjkk	5 min.

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