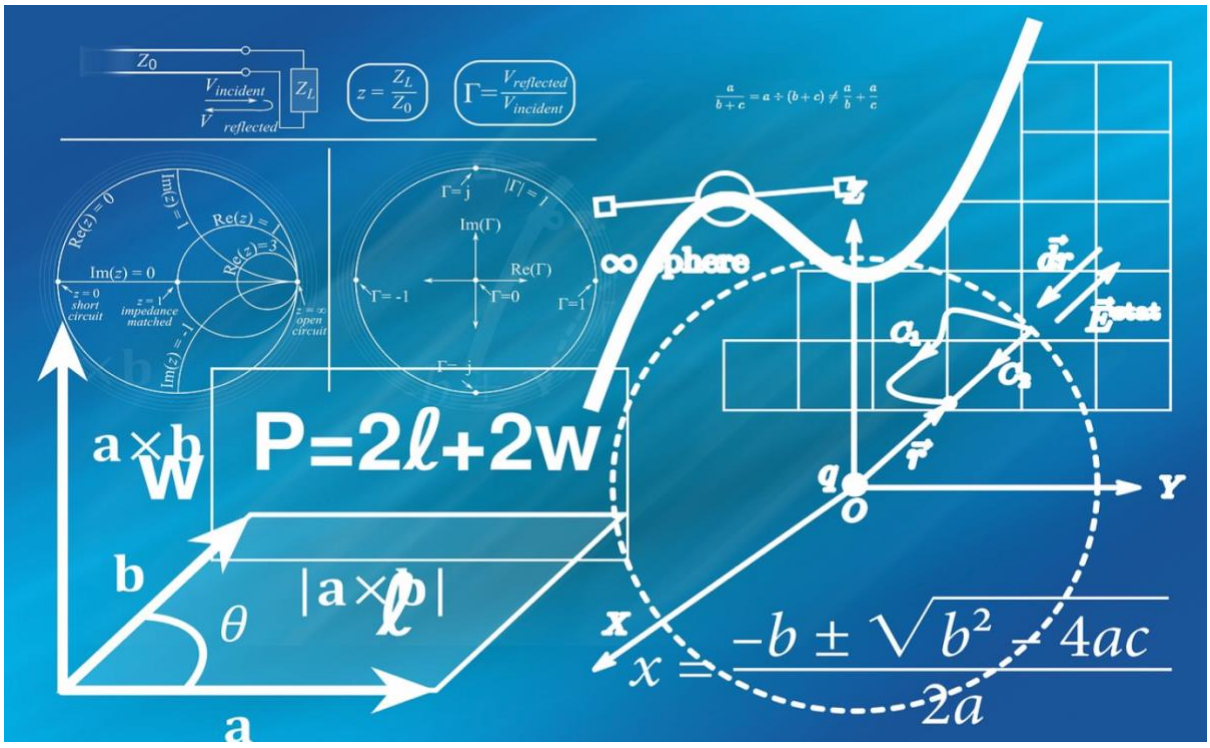
Academic English UK

Geometry



Instant Lessons

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Lesson Plan: Geometry EXAMPLE

Lessons: Introduction, reading, listening, speaking (seminar) and writing.
Time: 1-1.5 hours + homework task
Level: ********* [B1/ B2/C1].

Lesson Aim:

To focus on one key topic and develop a range of key academic skills based on this topic.

Introduction [5 minutes]

- Introduce the topic 'Geometry'**.**
- Give out the **'Reading Text Worksheet'** and discuss the lead in questions.

Reading: Test-Type Questions [20-30 minutes + feedback]

- Students read the text. Check words & meanings with a dictionary.
- Answer the questions.
- Feedback: distribute or project ANSWERS.

Listening: Lecture & Test Questions [30-40 minutes + feedback]

Video: Available in paid download
MP3: Available in paid download

- Give out the '**Listening: Mini Lecture Worksheet'.**
- Students check key vocabulary.

Option 1

- Students look at the questions.
- Students listen & answer the questions.
- Give 2 minutes to tidy answers.
- Students listen again. Check answers & answer missed questions.
- Feedback: distribute or project ANSWERS.

Option 2 (harder)

- Students listen & take notes (Use paper or the PPT slides in the Appendix).
- Students listen again & add to their notes.
- Students use their notes to answer the questions.
- Feedback: distribute or project ANSWERS.

Speaking: Seminar [10-15 minutes]

- Give out the '**Speaking Worksheet'.**
- Students revise content from the reading & lecture texts.
- Students hold a seminar discussion using the question prompts.
  How to run a seminar: https://www.academic-englishuk.com/seminars

Writing: Summary [20 minutes + tutor feedback]

- This can be a homework task if limited time.
- Students use the two texts (reading and listening) to write a 150-word paragraph on 'the role [redacted] and construction'.
- Tutor to error correct & return: https://www.academic-englishuk.com/error-correction

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Reading Text Worksheet

Task 1: Lead In

1. What are your memories of studying geometry at school?
2. [redacted]?
3. Look at the title of the reading text – what do you think it is about?

Task 2: Reading Text Geometry: Much more than a theoretical subject

By L. Dawkins (2022)

Geometry is considered to be one of the two oldest fields of mathematics, along with the study of numbers. Its name is derived from the Greek *gē* and *metria* meaning '[redacted]. Perimeters, length, congruence and symmetry are also explored. Both assumptions and applications of geometry have shifted dramatically since the [redacted]

There are several types of geometry, [redacted]. Euclidean geometry was founded in 300BC and encompasses the spatial relationships between [redacted] by the Greek mathematician Euclid. Since the late 19th century, several non-Euclidean branches of geometry have [redacted] examples include [redacted] two-dimensional (2D) surface, analytic geometry, in which coordinates and algebra are employed, differential geometry, whose principal [redacted], and hyperbolic geometry, which examines the parallelism postulate as well as the Euclidean axioms (The Encyclopaedia of Mathematics, 2020).

In modern times, geometry has many uses in [redacted]. The Society for Industrial and Applied Mathematics (SIAM, 2017) claims that although "experimental design outlines the best way to conduct drug trials", algebraic topology can determine [redacted] those drugs are meant to treat". Moreover, algebraic geometry is known to play a fundamental role in the design of self-driving cars. [redacted] blueprints and simulations of planned structures, whereas with regard to video games, thanks to isometric graphics and a technique known as raycasting, gamers are able to view the game from several perspectives, as well as control how their [redacted]. Furthermore, geometry is a key part of "global positioning systems (GPS) which require three coordinates" and space exploration, as it can help to calculate not only a [redacted] point and landing on a planet's surface (Brenner, 2018).

References

Brenner, L., (2018). *How Is Geometry Used in Real Life?* [online]. Available at: https://sciencing.com/geometry-used-real-life-8698204.html [Viewed 12.02.2022].
Encyclopaedia of Mathematics, (2020). *Geometry* [online]. Available at: https://encyclopediaofmath.org/wiki/Geometry [Viewed 12.02.2022].
Society for Industrial and Applied Mathematics (SIAM), (2017). *Using Algebra and Geometry in the Real World* [online]. Available at: https://www.youtube.com/watch?v=s-k9zIGu43A [Viewed 14.02.2022].

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Reading Text Questions

Task 3: Headings

Choose a subheading for each paragraph. One title is not needed.

1		**A**	Significant branches of geometry
2		**B**	
3		**C**	How we are taught geometry in school
		D	

____ / 3

Task 4: True, False or Not Given

Decide if these statements are true (T), false (F) or not given (NG). Highlight the answer in the text.

		T / F / NG
1	Geometry is the oldest field in mathematics.	
2	The	
3	Euclidean geometry was only known as geometry until the 19th century.	
4	Descriptive geometry	
5	The only difference between hyperbolic and Euclidean geometries is parallelism.	
6	Algebraic	
7	Both CAD and GPS require a form of geometry to function well.	
8	NASA	

____ / 8

Task 5: Vocabulary

Key language – search for the word in the text that means:

Paragraph		**Word**
1	Having the same shape or size.	
1		
2	A flat, horizontal surface.	
2		
2	A collection of points forming a certain kind of set.	
3		
3	The curved path of an object travelling in space.	

____ / 7

Total Score ___ /18

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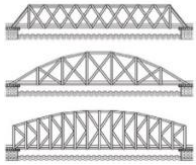
Listening: Mini Lecture Worksheet

Task 1: Key Vocabulary

Check these words and phrases before listening:

	rigidity		*frame*		*member*
tension	*compression*	*load*		*arch*	*intrinsic*

Task 2: Lecture Listening



Listen to the lecture on bridge construction and answer the following questions:

2.1 Gap Fill

Complete the purpose of a modern bridge. The first letter is already given.

Today's modern bridges are built with _____ and a_____ reasons in mind, making them an iconic s_____ of _____

____ / 2

2.2 Name ONE notable Truss bridge.

____ / 1

2.3 Open Questions

Answer these questions about the use of triangles in bridge structures.

i.	Which triangle is most commonly used?	
ii.	_____	
iii.	Why are scalene triangles not usually used?	
iv.	_____	
v.	What is the main reason for using triangles in bridges?	

____ / 5

2.4 Multiple Choice

Answer these questions about Truss bridges. Select ONE answer only per question.

i.	When was the Warren Truss bridge invented?	A. In 1840.
		B. _____
		C. Sometime between 1840 and 1848.
ii.	_____	A. Compression and tension above and below.
		B. _____.
		C. Compression above and tension below.
iii.	What were truss bridges originally designed to do?	A. _____
		B. Carry goods over water.
		C. _____
iv.	_____	A. They can be combined with other bridges.
		B. They are cheap to make.
		C. _____

____ / 4

2.4 Gap Fill

What does the lecturer say about future bridge structures? Complete the gaps.

Although modern bridges may use more _____ _____, the _____ a _____ part of the overall design and construction.

Total Score ___/14

____ / 2

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Speaking Worksheet

Discussion

Use the two texts (reading and listening) to discuss these questions:

Key Sources:

Reading: **Dawkins (2022)** Brenner (2018) / SIAM (2017)	Lecture: **Watts (2022)** Johnson (2021) / Blockley (N.D.) / Griggs (2015)

Seminar Questions

1) Where and when did geometry originate?

2) [redacted] geometry?

3) In which areas of everyday life can geometry be beneficial?

4) How [redacted] and construction?

5) Summarise your discussion.
(Each person summarises one main interesting point discussed).

Writing Task

Summary

Use the two texts (reading and listening) to write a paragraph on 'the role [redacted] and construction'.

Write 150 words:

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Reading ANSWERS

Task 3: Headings

Choose a subheading for each paragraph. One title is not needed.

1	*D*	**A**	Significant branches of geometry
2	*A*	**B**	Areas in which geometry can be applied successfully

____ / 3

ALL ANSWERS ARE INCLUDED IN PAID VERSION…

Listening ANSWERS

2.1 Gap Fill

Complete the purpose of a modern bridge. The first letter is already given.

Today's modern bridges are built with technical, social, financial and *aesthetic* reasons in mind, making them an iconic *symbol* of engineering.

____ / 2

ALL ANSWERS ARE INCLUDED IN PAID VERSION…

Triangles Used in Bridge Design and Construction

(H. Kennedy, 2022)

Hello and welcome to this brief lecture on how and why triangles are used in bridge design and construction. According to Brockley, the purpose of a bridge is both technical and social, which includes financial and aesthetic reasons. Today's bridges not only transport goods and people safely, but they are also a platform for a symbolic or iconic feat of engineering.

THE FULL TRANSCRIPT IS INCLUDED IN THE PAID VERSION…

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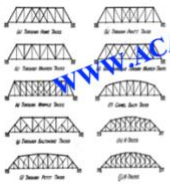
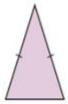
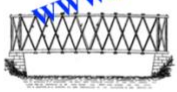
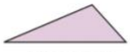
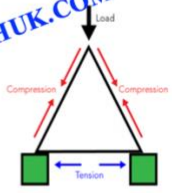
Appendix: PowerPoint Slides

Listen to the lecture and take notes using the PPT slides

Purpose of a bridge Brockley (2021) University of Bristol	
Triangles in bridge construction A Truss Bridge Equilateral Triangle Warren Truss Bridge (James Warren)  Sydney Harbour Bridge	
Triangles in bridge construction  Isosceles Triangle Right Angled Triangle  Isometric Truss by Alfred Neville 1840  Scalene Triangle  Load distribution	
Truss bridge examples Forth Railway Bridge Edinburgh Tower Bridge London	

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