The physics of playing guitar - Oscar Fernando Perez 12.02.2020

I Watch a video. What physical phenomena undergo this process of playing the guitar?

https://www.youtube.com/watch?v=cJunCsrhJjg

II Practise the vocabulary from the film at:

https://quizlet.com/484597588/the-physics-of-playing-guitar-flash-cards/

III Watch the film and answer the questions.

https://ed.ted.com/lessons/the-physics-of-playing-guitar-oscar-fernando-perez

Guitar masters like Jimi Hendrix are capable of bending the physics of waves to their wills, plucking melody from inspiration and vibration. But how do wood, metal, and plastic translate into rhythm, melody, and music? Oscar Fernando Perez details the physics of playing the guitar, from first pluck to that final shredding chord.

Link to the activity III:

https://ed.ted.com/lessons/the-physics-of-playing-guitar-oscar-fernando-perez

1 Many factors affect the frequency of a vibrating string. Which of the answers below is incorrect?

A Density

B Flexibility

C Length

D Tension

2 On an electric guitar, pickups translate string vibrations into _____.

A Electromagnetic waves

B X-Ray signals

C Sound waves

D Electric signals

3The "pitch" of a sound is defined by its _____.

A Tone

B Frequency

C Quality

D Wave velocity

4 On an instrument, when you play more than two notes at the same time you are creating a(n) _____.

A Overtone

B Song

C Chord

D Melody

5 If you double the frequency of a particular note on any instrument you get a(n):

A Octave

B Double

C Chord

D Third minor

6 Western scale is based on the overtone series of a vibrating string which contains 12 notes in between octaves (Chromatic scale: C, C#, D, D#, E, F, F#, G, G#, A, A#, B, C). Design another possible scale.

7Why can you distinguish between instruments even when they are playing the same note?

8 Does the sound of an engine or a breaking glass have a particular note or can only tuned musical instruments produce particular notes?

9 Are frets necessary for a guitar to produce music? Why?

IV Match the following English expressions with their Polish equivalents:

1_____ X-Ray signals	a elastyczność
2_____ pitch	b przetwornik elektroakustyczny
3_____ sound waves	c przekładać się na
4_____ shredding chord	d sygnał rentgenowski
5_____ flexibility	e podton
6_____ third minor	f gęstość
7_____ vibrating string	g napięcie
8_____tension	h prędkość fali
9_____vibration	i rozróżniać
10____density	j drgająca struna
11____ overtone	k fale dźwiękowe

12____ tuned l fale elektromagnetyczne

13____ pickup m nastrojony

14____ pluck n podwojenie

15____ electromagnetic waves o drganie, wibracja

16____ distinguish p niszczący akord

17____ translate into q sygnały elektryczne

18____ electric signals r wysokość tonu

19____ wave velocity s szarpać struny

20____ double t interwał małej tercji

V Work in pairs, watch the film and think what the endings of these sentences are.

1. The vibrations translate through the neck and bridge to the guitar's body, where …
2. A quickly vibrating string will cause a lot of compressions close together, making…
3. Four things affect the frequency of a vibrating string: …
4. If you pluck the string near the middle, you get mainly …
5. When we hear one note played with another that has exactly twice its frequency, its first overtone, they sound …
6. Fretless instruments, like violins, make it easier to …, but add to …
7. Playing two or more strings at the same time allows you to create …
8. For example, when you play two notes whose frequencies are close together, they add together to …, producing a …. the beats.

VI Match the sentences halves.

1___	When you pluck a guitar string, you	a. slowly producing lower notes.
2___	The pitch of that sound depends	b. tailored to the chords we like to play and the physiology of our hands.
3___	Thicker strings vibrate more	c.to form a complex wave with a rich sound.
4___	All these standing waves combine	d. the string affects which overtones you get.
5___	Changing the way you pluck	e. on the overtone series of a vibrating string.
6___	The familiar Western scale is based	f. create a vibration called a standing wave.
7___	The number of string and their tuning are custom	g. change the nature and sound of the vibrations.

8___	Guitar shapes and materials can also vary, and both	h. on the frequency of the compressions.

VII Dictation. Write the text you can hear and give it to your partner for peer-correction. Check the text with your teacher.

VIII Answer the questions:

1. Is the physics of music only useful for entertainment? Why? / Why not? Give arguments, examples.
2. Do phenomena connected with the music produced by a guitar affect the condition of human hearing?

IX Quizizz: musical instruments

https://quizizz.com/admin/quiz/5a2823ef32acd2140095f2ed/music-unit-3-klasa-v

GM quiz

https://quizizz.com/admin/quiz/58dfed7243d547ba5466dddd/music

Key

III

1 b

2 d

3 b

4 c

5 a

6 When we hear one note played with another that has exactly twice its frequency, its first overtone, they sound so harmonious that we assign them the same letter, and define the difference between them as an octave.

IV

1d, 2r, 3k, 4p, 5a, 6t, 7j, 8g, 9o, 10f, 11e, 12m, 13b, 14s, 15l, 16i, 17c, 18q, 19h, 20n

V

1 The vibrations translate through the neck and bridge to the guitar's body, where the thin and flexible wood vibrates, jostling the surrounding air molecules together and apart.

2 A quickly vibrating string will cause a lot of compressions close together, making a high-pitched sound, and a slow vibration produces a low-pitched sound.

3 Four things affect the frequency of a vibrating string: the length, the tension, the density and the thickness.

4 If you pluck the string near the middle, you get mainly the fundamental and the odd multiple overtones, which have anti-nodes in the middle of the string.

5 When we hear one note played with another that has exactly twice its frequency, its first overtone, they sound so harmonious that we assign them the same letter, and define the difference between them as an octave.

6 Fretless instruments, like violins, make it easier to produce the infinite frequencies between each note, but add to the challenge of playing intune.

7 Playing two or more strings at the same time allows you to create new wave patterns like chords and other sound effects.

8 For example, when you play two notes whose frequencies are close together, they add together to create a sound wave whose amplitude rises and falls, producing a throbbing effect, which guitarists call the beats.

VI

1f, 2h, 3a, 4c, 5d, 6e, 7b, 8g

1 When you pluck a guitar string, you create a vibration called a standing wave.

2 The pitch of that sound depends on the frequency of the compressions.

3 Thicker strings vibrate more slowly producing lower notes.

4 All these standing waves combine to form a complex wave with a rich sound.

5 Changing the way you pluck the string affects which overtones you get.

6 The familiar Western scale is based on the overtone series of a vibrating string.

7 The number of string and their tuning are custom tailored to the chords we like to play and the physiology of our hands.

8 Guitar shapes and materials can also vary, and both change the nature and sound of the vibrations.

VII

And lest you think that the physics of music is only useful for entertainment, consider this. Some physicists think that everything in the universe is created by the harmonic series of very tiny, very tense strings. So might our entire reality be the extended solo of some cosmic Jimi Hendrix? Clearly, there's a lot more to strings than meets the ear.