Biomechanical Principles

1. Question & Research Task

Biomechanical principles explain the body's movement. It is crucial to understand what role they play in physical activity and how they can improve your performance.

Giovanni Borelli is known as the father of modern biomechanics. Click this link to learn more about his contributions.

Think about these questions:

- What is biomechanics and how was it developed?
- What are the biomechanical principles?
- How do they assist in the body's movement?
- How can using these principles improve a particular skill?

Select the image above to view a video from Discovery Education about Biomechanical Engineers.

Image Source: Discovery Education

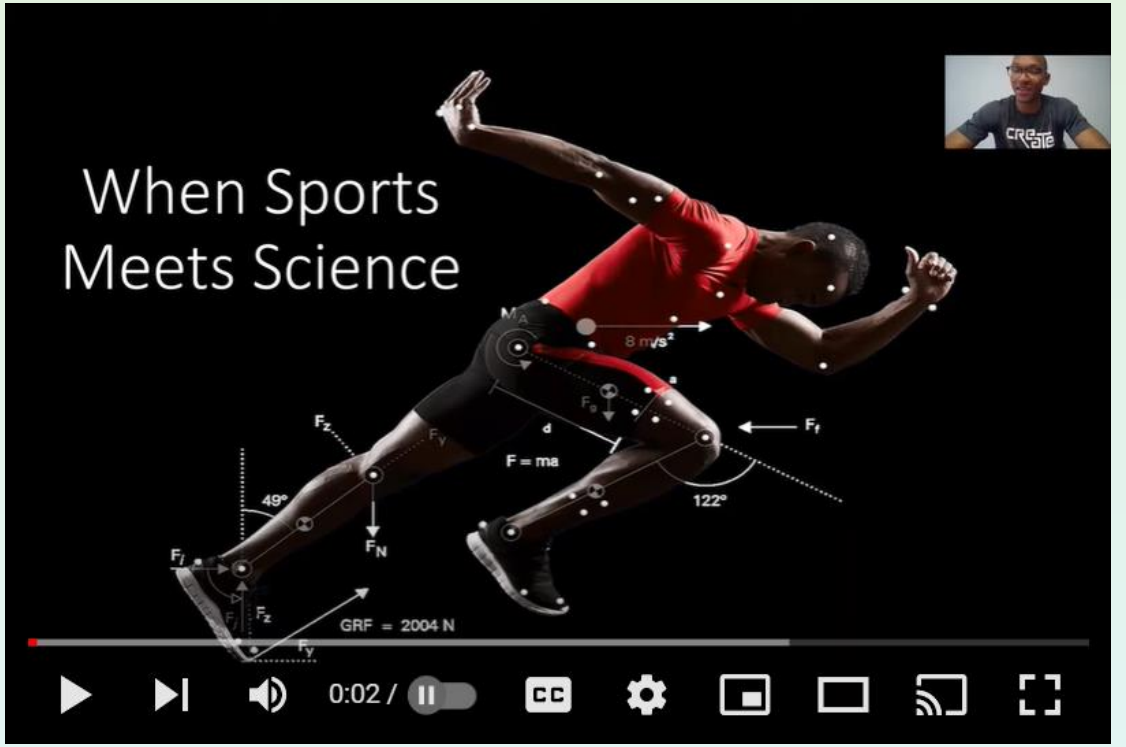
In this Slam Dunk, you will conduct brief, focused research to respond to the inquiry question:

How are biomechanical principles essential to either skill performance or the analysis of the skill?

2. Information Sources

Use the resources below and the video on the right dig deeper into your understanding of biomechanical principles.

- What is Biomechanics?
- Biomechanics for Functional Training, Sports Performance, Strength and Conditioning: Injury Prevention, Rehabilitation and Management: an article from Positive Health Online
- The Biomechanics of Playing Soccer
- Going full circle with biomechanics expert Jill McNitt-Gray



Select the image above to view a video to help you better understand Biomechanics.

Image Source: YouTube

3. Student Activity

You will choose to focus on one of the biomechanical principles listed here.

Principles of Biomechanics

Use this Cornell Notes template to organize your notes:

Cornell Notes

On your Cornell Notes sheet, be sure to:

- Choose one biomechanical principle and explain how it works. Record your notes.
- Explain how that principle pertains to a skill using the correct terminology and concepts.
- Identify which biomechanical principles will help improve skill performance.
- Keep the essential question in mind: *Why are biomechanical principles essential to either skill performance or the analysis of the skill?*

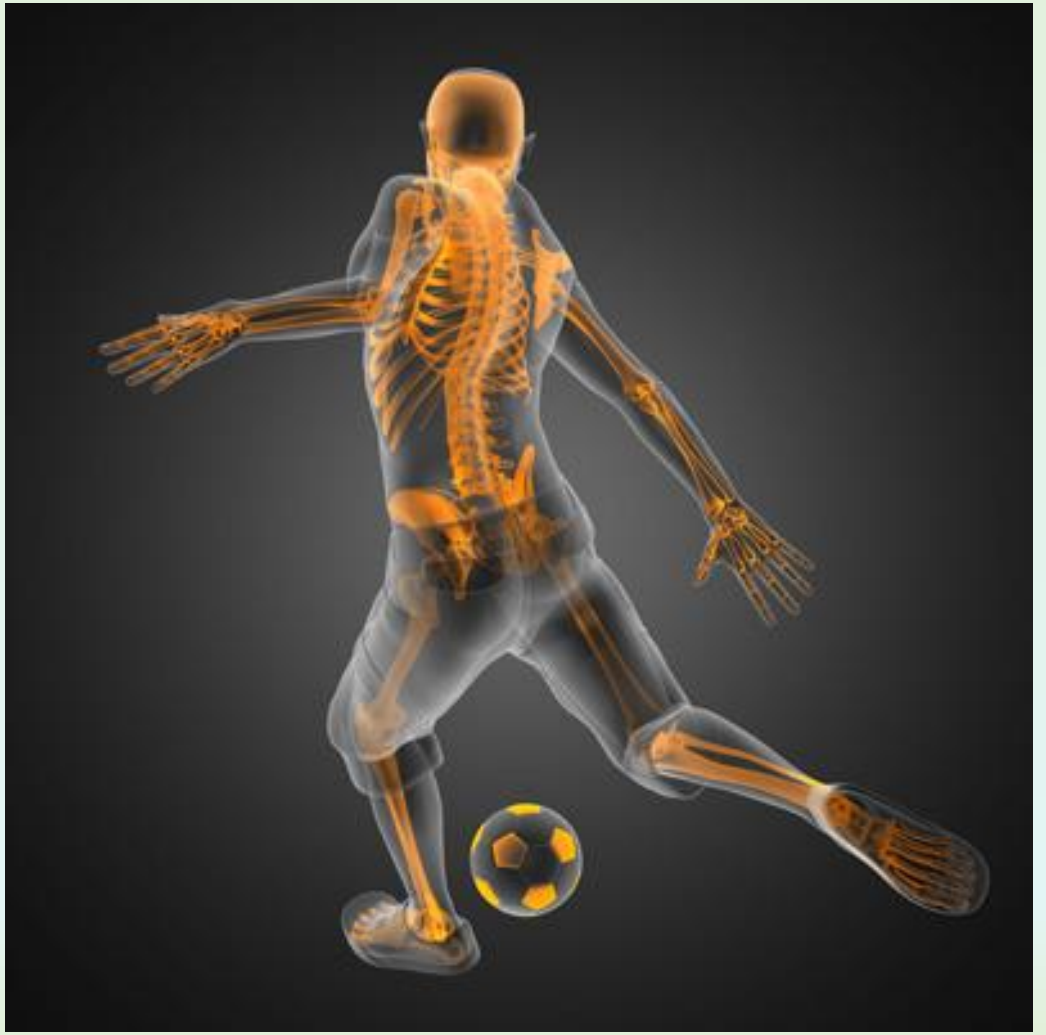


Image from Barry University.

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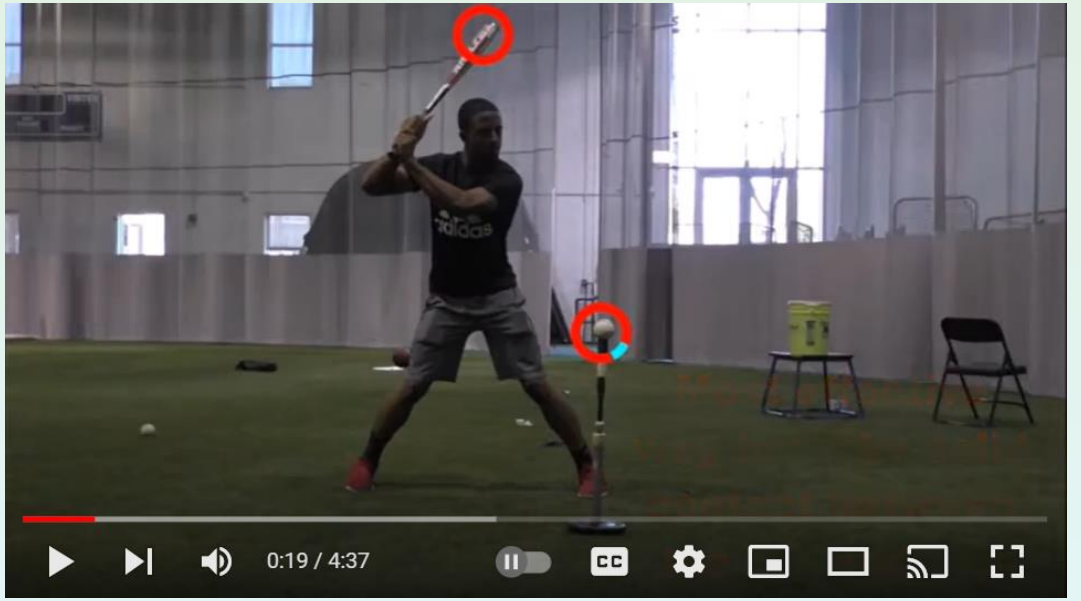
4. Assessment Activity

How are biomechanical principles essential to either skill performance or the analysis of the skill?

Using what you have learned, you will now create a video of a sport-specific skill and analyze the biomechanical principle that is involved.

Use the following questions to guide your video:

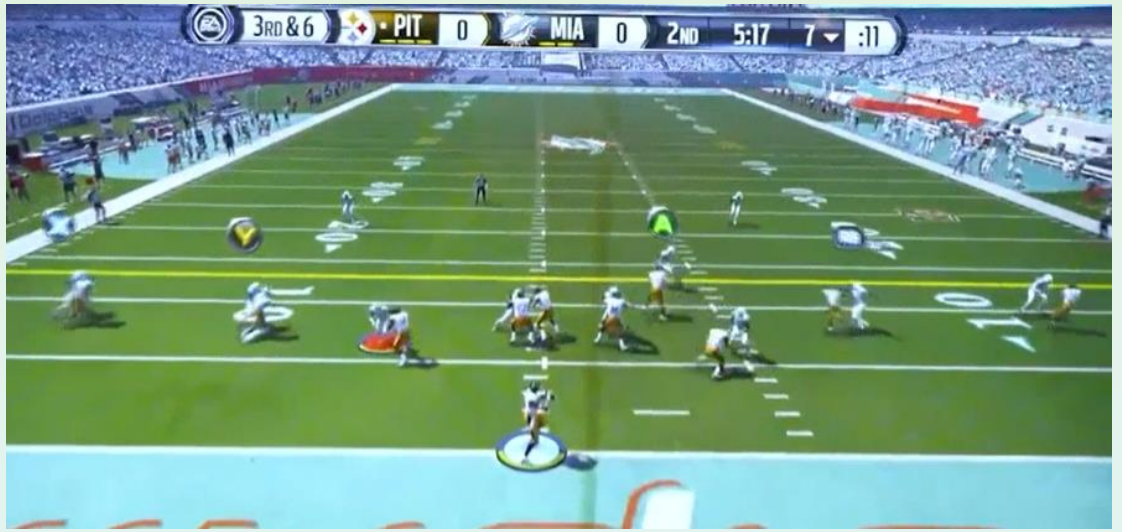
- What biomechanical principle is being used in the movement?
- How do they assist in the body's movement?
- How can improving one of the principles improve a particular skill?
- Why are biomechanical principles essential to either skill performance or the analysis of the skill?



Select the image above to view a video about the biomechanics of swinging a baseball bat.

Image Source: YouTube

5. Enrichment Activities



Select this image above to view a video on how movement is captured for *Madden*.

Image Source: Discovery Education

View the resources below to learn how biomechanics are used in different careers:

- Mimicking Muscles & Tendons: Discovery Education (video)

- Stair-Climbing Wheelchair: Discovery Education (video)

Using these resources create a presentation to share with your class about how the biomechanical principles have been applied to these different careers.

Presentation tools:

Google Slides

Be sure to cite sources for information and pictures used in your presentation.

6. Teacher Resources

SLIDE NAVIGATION

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Learning Standards Alignment

PE Standards
Standard 2: Applies knowledge of concepts, principles, strategies and tactics related to movement and performance.

S2.H2 Movement concepts, principles, and knowledge

S2.H2.L1 Uses movement concepts and principles (e.g., force, motion, rotation) to analyze and improve performance of self and/or others in a selected skill.

Common Core State Standards for English Language Arts & Literacy

Reading: 1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

Writing: 7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.

AASL Standards Framework for Learners Inquire: Build new knowledge by inquiring, thinking critically, identifying problems, and developing strategies for solving problems.

Think: Learners display curiosity and initiative by:

I.A.2 Recalling prior and background knowledge as context for new meaning.

Create: Learners engage with new knowledge by following a process that includes:

I.B.1 Using evidence to investigate questions. I.B.3 Generating products that illustrate learning.

Share: Learners adapt, communicate, and exchange learning products with others in a cycle that includes:

I.C.1 Interacting with content presented by others.

Grow: Learners participate in an ongoing inquiry-based process by:

I.D.2 Engaging in sustained inquiry.

P21 Framework: 21st Century Student Outcomes
3. Information, Media & Technology Skills: Information Literacy: Access information efficiently and effectively; Use information accurately and creatively for the issue or problem at hand.
ICT Literacy: Use technology as a tool to research, organize, evaluate and communicate information.

Grade 9-12 Physical Education

Objective: Students will be able to conduct brief, focused research in order to understand why biomechanical principles are essential to skill performance and skill analysis by creating a video of a sport specific skill that analyzes the biomechanical skills involved.

Time Frame: One 90-minute class period

Differentiation strategies for this lesson:

- Have students use learning supports provided in BCPS Digital Content in the Apps Portal.
- Refer to Digital Content Snapshot/Support pages as needed

Notes to the teacher:

- Collaborate with your school library media specialist to plan and implement this lesson.
- Consider using the Schoology Assignment Apps feature to assign Microsoft and Google documents and files for students to access, edit, and submit through Schoology