STEAM &Sports

Lesson 7 - Move like and Athlete:
Unlocking the Science of Motion

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Move Like an Athlete: Unlocking the Science of Motion

Concept

Students will explore the mechanics of human motion during athletic activities such as running, jumping, or throwing. Through hands-on experiments and analysis, they will learn how body movements, muscle coordination, and physics principles impact athletic performance.

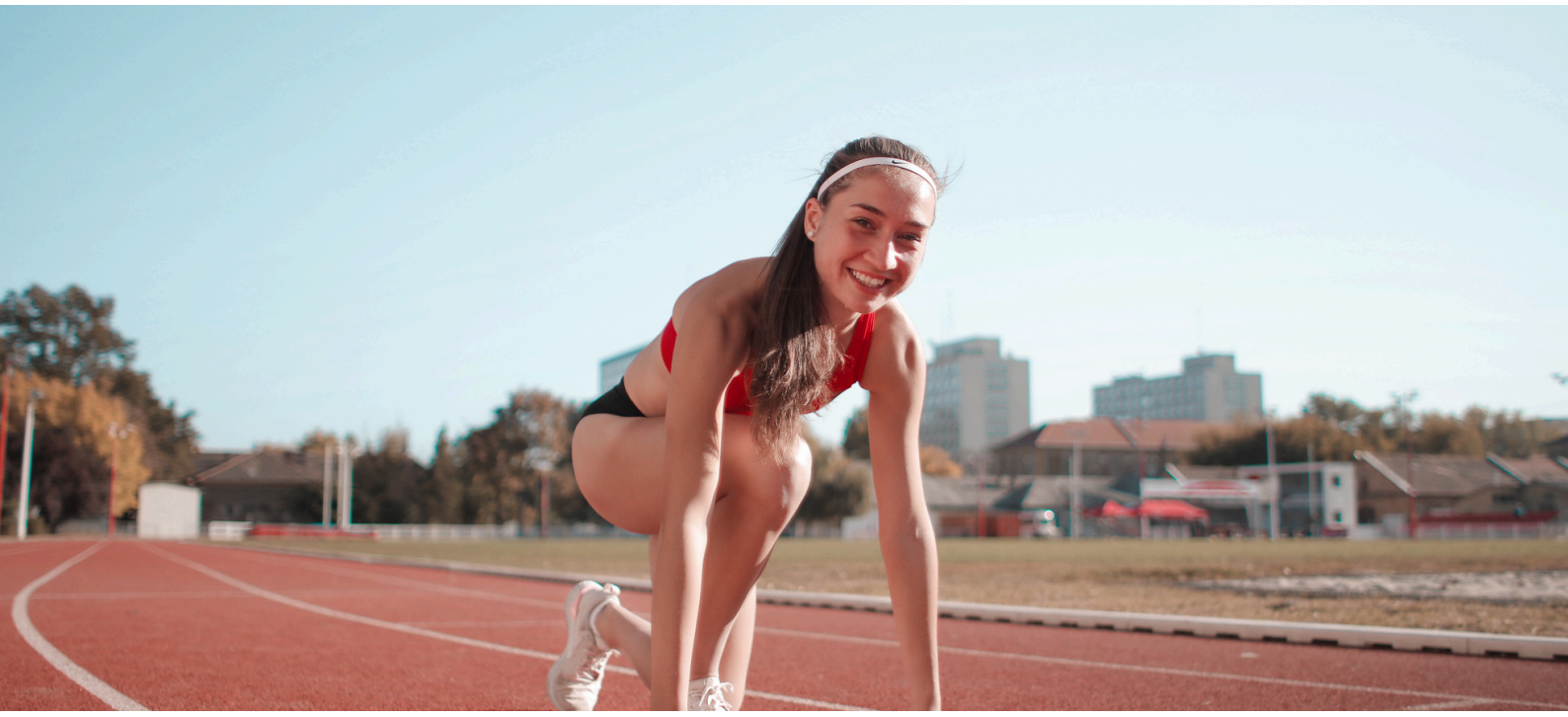
Learning objectives and Outcomes

Upon completion of this lesson, students will know:

1. The role of muscles, joints, and force in athletic movements.
2. Basic physics principles like force, motion, and energy transfer in human motion.
3. How coordination and biomechanics affect athletic performance.
4. The impact of balance, stability, and posture on movement efficiency.

Students will be able to:

1. Analyse athletic movements using tools like slow-motion video.
2. Apply biomechanical concepts to improve performance in sports activities.
3. Explain how forces and motion impact different types of athletic performance.
4. Assess movement patterns to identify potential improvements and injury prevention strategies.



Educational Standards in Connection with Sports

The lesson integrates science, mathematics, and physical education, aligning with national and international curricula. It promotes:

1. Understanding biomechanics, force, and motion (science).
2. Applying measurement and data analysis skills (mathematics).
3. Enhancing movement awareness and performance (physical education).

Subjects covered in this lesson

1. Biology (Human Anatomy)
2. Physics
3. Physical Education

Timeframe

The expected duration of the lesson is 90 minutes

Age Group

12–15 years

Material needed

1. Gymnastics mats or open space for movement activities
2. Measuring tape or markers for distance tracking
3. Smartphones/tablets with slow-motion video capabilities
4. Diagrams or models of human anatomy
5. Graph paper or access to graphing tools
6. Stopwatch

Short description of the content

Students will investigate how the human body moves during athletic activities. By studying running, jumping, and throwing, they will analyze how muscles, joints, and forces work together to create motion. Using slow-motion video and measurements, students will connect biomechanical concepts to real-world sports scenarios.

They will examine the efficiency of movements, explore how different body positions impact performance, and discuss how biomechanics can help athletes refine techniques and reduce the risk of injury. Through group experiments, data collection, and discussions, students will gain a deeper understanding of human motion and how scientific principles apply to sports and everyday movement.

Methodology

Students work in mixed-ability groups of 3–4, selecting a motion to analyse (e.g., running, jumping, or throwing). Groups conduct experiments, record movements using slow-motion video, and analyse data to connect theory to practice.

Inclusion
Adaptations: Visual aids, accessible tasks, and clear instructions ensure inclusivity for diverse learners.

Objectives Link: Collaboration, experimentation, and data analysis develop critical thinking and connect biomechanics to real-world sports.

Sequence of the lesoon

1. Engage (10 minutes)
Show a slow-motion video of an athlete running, jumping, or throwing.

Ask students:

- What do you notice about the athlete's movements?
- How do different body parts work together during the motion?
- Discuss how biomechanics can help athletes improve their performance.

2. Explore (25 minutes)
Divide students into small, mixed-ability groups.
Assign each group an activity to analyze (e.g., running, jumping, or throwing).

Experiment:
Groups record their assigned activity using slow-motion video.
Measure distances, heights, or times (e.g., jump height, throw distance).
Observe how muscles and joints contribute to the motion.

Data Collection:
Students create tables or graphs to document their findings, for example:

Jump Type	Jump Height (cm)	Jump Distance (cm)	Primary muscles used
Standing Jump	40cm	90cm	Quadriceps, Calves
Running Jump	55cm	160cm	Quadriceps, Hamstrings, Calves

3. Elaborate (20 minutes)
Analysis:

- Use anatomy diagrams to identify the muscles and joints involved in each activity.
- Discuss how force, motion, and coordination impact performance.
- Compare findings across groups to highlight differences between mo

Discussion Questions:

- Which muscles were most active during each activity?
- How does body positioning affect performance?

4. Evaluate (15 minutes)

Groups present their findings with visual aids (e.g., charts, annotated videos).

Class discussion:

- What strategies could athletes use to optimize their movements?
- How do biomechanics apply to sports like gymnastics or soccer?

5. Extend (20 minutes)

Brainstorm:

- How could technology, like wearable motion trackers, improve biomechanical analysis?
- How do biomechanics differ across sports, such as swimming or cycling?

Optional Challenge:

Students design an experiment to test a new movement, such as comparing running techniques or throwing styles.

Tips for age group differentation (for older/younger kids than indicated in the lesson)

For younger students (10–12 years): Use simplified anatomy diagrams and pre-recorded slow-motion videos instead of filming. Focus more on observation and naming key body parts and movements.

For older students (15–16 years): Add calculations related to force and acceleration. Introduce Newton's laws and have them hypothesise and test improvements in form or posture.

To which SDG(s) does the lesson relate most

SDG 3: Good Health and Well-being
Promotes awareness of physical movement and injury prevention.

SDG 4: Quality Education
Encourages cross-disciplinary learning through science, physical education, and technology.

What Inclusivity and Accessibility measures can or should the teacher take for this lesson

Provide alternative roles in group work (e.g., data recorder, video analyst) for students unable to physically participate.

Ensure all visual aids are high-contrast and text is easy to read.

Offer step-by-step instructions and verbal explanations alongside written tasks.

Use pre-recorded videos if filming is not accessible.

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