Health and movement science Stage 6 (Year 12)

Biomechanics for sustained movement and performance – learning sequence

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This resource has been developed to assist teachers in NSW Department of Education schools to create learning that is contextualised to their classroom. It can be used as a basis for the teacher’s own program, assessment, or scope and sequence, or be used as an example of how the new curriculum could be implemented. The resource has suggested timeframes that may need to be adjusted by the teacher to meet the needs of their students.

# Overview

This learning program is intended to be completed in Year 12 as part of Focus area 2 – Training for improved performance.

Five hours have been allocated to this program of learning.

# Prior learning

Before undertaking this learning sequence, students should have demonstrated sound understanding of:

* the interrelationship between biomechanical principles and the muscles, bones and joints of the body for safe movement
* the types of training and training methods and their relevance for a variety of sports
* application of the principles of training, progressive overload, training thresholds, reversibility, specificity, variety and warm-up and cool down to both aerobic and strength training
* aspects that need to be considered when designing a training session for individual and group sports.

Opportunities for reflection and adjustments can be made depending on student interest.

# Purpose

Biomechanics is the area of study with a focus on how and why we move. By applying the fundamental principles of physics to human movement, biomechanists describe and measure movement, and study the causes of such movement. Biomechanics in sports involves a detailed analysis of sports movements to minimise the risk of injury and improve performance (NESA 2024).

The purpose of this learning sequence is to explain how biomechanics can be used to develop efficient movements for sustained movement and improved performance. Using a sport-specific movement example from volleyball, students engage in the study of volleyball spiking, to explain the critical biomechanical principles governing sustained movement and enhanced performance. By employing a method of inquiry and exploring a range of coaching resources, students develop an in-depth understanding of the techniques needed to execute a biomechanically sound and precise spike.

Through a case study, students then analyse the potential injuries that athletes may incur if they fail to employ proper biomechanics in this skill. As a result, students evaluate techniques and recommend appropriate training methods to develop efficient movement for sustained movement and improved performance.

Through the preliminary course, students have outlined the interrelationship between biomechanical principles and the muscles, bones and joints of the body for safe movement. Through the HSC course students have:

* assessed the types of training and training methods and their relevance for a variety of sports
* evaluated the application of the principles of training, progressive overload, training thresholds, reversibility, specificity, variety and warm-up and cool down to both strength and aerobic training
* compared aspects that need to be considered when designing a training session for individual and group sports.

Through this learning sequence, students are required to apply this learning to a case study.

# Syllabus

The following syllabus outcomes and content is addressed if all the teaching activities are completed. Teachers are to use their professional judgement to ensure that the suggested syllabus content is addressed.

## Outcomes

A student:

* investigates factors that impact movement and performance **HM-12-04**
* Problem-solving: proposes and evaluates solutions to complex health and movement issues **HM-12-09**
* Research: analyses a range of sources to make conclusions and judgements about health and movement concepts **HM-12-10**

[Health and Movement Science 11–12 Syllabus](https://curriculum.nsw.edu.au/learning-areas/pdhpe/health-and-movement-science-11-12-2023/overview) © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2023.

## Content

### Focus area 2 – Training for improved performance

**How do individuals train for sustained movement and performance?**

* Explain how biomechanics can be used to develop efficient movements for sustained movement and improved performance

**Example(s):**

Physical activity.

Sport-specific movements.

Functional movements.

# Learning sequence 1 – biomechanics of spiking

Before undertaking this learning sequence, students should have demonstrated sound understanding of the:

* interrelationship between biomechanical principles and the muscles, bones and joints of the body for safe movement.

Opportunities for reflection and adjustments can be made depending on student interest.

## Learning intentions and success criteria

**Explicit teaching note:** learning intentions and success criteria are most effective when they are contextualised to meet the needs of students in the class. The examples provided in this document are generalised to demonstrate how learning intentions and success criteria could be created.

Through these activities, students will:

* understand the basic biomechanical principles involved in an effective spiking action in volleyball
* recognise key factors contributing to sustained and efficient spiking.

## Biomechanics of a spike

Students view the video clip of a professional volleyball player spiking, such as [Most Powerful Spikes of the Men’s Volleyball World Cup 2019](https://youtu.be/1iYSjJP4ZD8?si=MacgUpFHk8BPYRns) (4:23).

Students share their observations about the athletes’ movements in the video and brainstorm the biomechanical principles they consider as relevant to spiking in volleyball.

**Note:** this should allow for revision of Year 11 content outlining the interrelationship between biomechanical principles such as motion, balance and stability, fluid mechanics and force, and the muscles, bones and joints of the body for safe movement.

Students [Think-Pair-Share](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/645?clearCache=c62926f6-2c88-cd20-569a-1a2db076de4c) the importance of proper technique and body mechanics in volleyball for the individual athlete. Share ideas with another pair or the whole class.

Students view [HLPE3531: Biomechanics Of The Volleyball Spike](https://www.youtube.com/watch?v=VXnbRGF8eFc&pp=ygUgYmlvbWVjaGFuaWNzIG9mIHZvbGxleWJhbGwgc3Bpa2U%3D) (3:18). This video breaks down the execution of a spike into phases and considers the biomechanical principles of each phase. Students answer the following questions related to the video to build understanding for further application.

**Note:** the video uses some biomechanical language that is beyond the teachings of the syllabus. The questions below redirect the learnings of the video into what students need to know. Answers are also provided under each question.

A PowerPoint presentation is included to support this activity and can be accessed on the [Planning, programming and assessing PDHPE 11–12](https://education.nsw.gov.au/teaching-and-learning/curriculum/pdhpe/planning-programming-and-assessing-pdhpe-k-12/planning-programming-and-assessing-pdhpe-11-12) webpage.

Access [Resource 1 – glossary of biomechanical key words](#_Resource_1_–-) to support the learning.

## Biomechanics questions and answers

### Phase 1 – the approach (0:14–0:46)

The athlete will begin running towards the ball serving 2 biomechanical purposes that reflect Newton’s third law. Firstly, the force applied from the legs and feet into the ground will be reciprocated providing a propulsive force that accelerates the body’s mass forward. This propulsive force and acceleration forward will allow the athlete to gain velocity and momentum. The athlete then takes a leaping step. All momentum gained can then be translated as kinetic energy (energy of motion) into the jump phase.

1. How does Newton’s third law of motion help the athlete start running towards the ball?

**Sample answer:** Newton’s third law of motion states that for every action, there is an equal and opposite reaction. When the athlete pushes down and back against the ground with their legs and feet, the ground pushes back with an equal force in the opposite direction. This reaction force from the ground moves the athlete forward, helping them to start running and overcome their initial state of rest or inertia*.*

1. How does the athlete use the momentum gained from running to jump effectively?

**Sample answer:** as the athlete runs, the propulsive force from their legs and the reaction from the ground increases their forward velocity and momentum. When the athlete takes a leaping step, all the momentum they have built up from running is converted into kinetic energy, the energy of motion. This helps the athlete to jump higher and further. This use of momentum allows the athlete to perform a powerful and effective jump for spiking a volleyball.

### Phase 2 – the jump (0:47–1:03)

The athlete now lowers their centre of mass and applies the resultant kinetic energy from the previous phase into the ground as the propulsive force necessary to accelerate that mass upward. This is crucial in maximising the vertical velocity of the jump and thus the jump height.

1. How does lowering the centre of mass help an athlete jump higher?

**Sample answer: l**owering the centre of mass helps an athlete jump higher by allowing them to generate more force against the ground. When the athlete bends their knees and lowers their body, they store potential energy in their muscles. As they quickly straighten their legs and push off the ground, this stored energy is converted into kinetic energy, which propels them upward. This increased force and energy transfer maximises the vertical velocity of the jump, making the athlete jump higher.

### Phase 3 – the arm swing (1:04–1:36)

The wind-up action of the hitting arm begins alongside a twisting action of the torso. This is known as the ipsilateral rotation of the body over an axis. Notice the arms rotating conversely with the left arm of the athlete following a high to low motion while the right arm follows a low to high motion with the spine rotating laterally to open the angle of the body. This clearly demonstrates ipsilateral rotation. The resulting position of the body sets up optimal position for angular momentum and velocity that can be generated from the kinetic chain to follow in the next phase.

1. What is ipsilateral rotation, and how does it help in the wind-up action of the hitting arm?

**Sample answer:** ipsilateral rotation is when one side of the body moves in the same direction, such as when your torso twists to the same side as the arm you are using to hit. This helps in the wind-up action of the hitting arm by allowing the body to build up energy. When your torso twists and your arms move in opposite directions (one arm goes up while the other goes down), it creates a strong position to generate a lot of speed and power for the hit.

**Note:** a similar action is seen in overarm bowling action in cricket and a tennis serve.

1. How does the movement of the arms and spine during the wind-up action help in generating power for a hit? The athlete is right-handed.

**Sample answer:** during the wind-up action, the left arm moves from high to low while the right arm moves from low to high, and the spine rotates to the side. This coordinated movement helps to open up the body, creating a larger angle and a stronger position. This setup allows the body to use the kinetic chain, where energy is transferred from the legs through the torso and finally to the arms. This process helps generate a lot of angular momentum and velocity, making the hit more powerful.

### Phase 4 – hitting the ball (1:37–2:10)

Through a sequential chain of movements, maximal force can be generated and transferred onto the ball for an effective shot. Firstly, ipsilateral rotation continues opening the angle of which the arms rotate through at the shoulder generating angular velocity and momentum from which the arms extend at the elbow as rotation continues until the hand contacts the ball. The resultant momentum and energy from this kinetic chain is translated onto the ball as a propulsive force downward.

1. Why is it important to extend your arms at the elbow when taking a shot?

**Sample answer: e**xtending your arms at the elbow when taking a shot is important because it helps increase the speedand force of your shot. As you rotate your body and your arms move faster, extending your elbows lets your hands reach their highest speed just before hitting the ball. This way, all the speed and power you’ve built up through your body and arm movements get transferred to the ball, making the shot more powerful and effective. This is known as summation of forces.

### Phase 5 – the wrist snap (2:11–2:44)

By flexing the hand at the wrist and hitting the ball above its centre of mass the directional force applied from the athlete should generate topspin off the ball. The Magnus effect comes into play as a crucial principle that forces the ball in a downward direction. With a clockwise rotation of the ball, the air on the top of the ball slows down while the air at the bottom of the ball speeds up. This results in an air pressure gradient where energy moves from high to low pressure generating force from the top of the ball downward. The ball will now move faster towards the ground.

1. How does hitting a ball above its centre and making it spin create topspin, and why does the ball move downward faster because of the Magnus effect?

**Sample answer:** when you hit the ball above its centre and flex your wrist, you make the ball spin forward, creating topspin. This means the top of the ball moves forward while the bottom moves backward.

Because of the Magnus effect, the air around the spinning ball behaves differently. The air on top of the ball slows down, while the air at the bottom speeds up. This difference in airspeed creates lower pressure on the top and higher pressure on the bottom of the ball. The ball is then pushed downwards faster due to this pressure difference, making it move towards the ground more quickly.

### Phase 6 – the spike follow-through (2:55–3:38)

Continuing the range of motion created from the kinetic chain in the hitting phase serves 2 purposes, firstly the momentum through the ball maintains direction for an accurate flight path and secondly ensures that the limbs involved have a clear path of motion where they can come to rest and not stop suddenly, thereby safely dissipating all leftover kinetic energy that would otherwise place unwanted strain on the joints.

1. Why is it important for the body to continue moving smoothly after hitting the volleyball?

**Sample answer: i**t is important for the body to keep moving smoothly after hitting a ball for 2 main reasons. Firstly, for accuracy. When you swing and hit the ball, continuing the motion helps guide the ball in the right direction. If you stop suddenly, it can mess up where the ball goes. Secondly, for safety. Letting your body follow through with the motion helps spread out and safely release the leftover energy from the hit. This prevents sudden stops that can strain or injure your joints, like your elbows or shoulders.

Next, students are to use Table 1 to identify the biomechanical principle in action for each phase of the volleyball spike.

Table 1 – matching spiking action to biomechanical principles

|  |  |
| --- | --- |
| Phase | Biomechanical principle |
| 1. The approach
 | Linear motionNewton’s Third Law of Motion |
| 1. Jump
 | Propulsive force, summation of forceBalance and stability |
| 1. Arm swing
 | Motion: momentum and speed |
| 1. Hitting the ball
 | Force, summation of forceNewton’s Second Law of Motion |
| 1. Wrist snap
 | Magnus effect: application of force/fluid mechanics |
| 1. Follow-through landing
 | Absorption of force |

## Spiking in volleyball – practical application

Students watch [Best volleyball spiking drills for beginners](https://youtu.be/Vyk4K8R9CLM?si=Fpi0swr4ilBxj1Ja) ever (5:56). Students form small groups to participate in the spiking drills demonstrated in the video. Students select a drill(s) and answer the questions below.

* What phase of the spike does the drill develop?
* What biomechanical principle does the drill develop?
* How does the drill provide training for sustained efficient movement?
* How does the drill improve performance?

Students report back to the class and share their findings.

# Learning sequence 2 – improving efficiency

Before undertaking this learning sequence, students should have demonstrated sound understanding of:

* the interrelationship between biomechanical principles and the muscles, bones and joints of the body for safe movement
* how biomechanics can be used to develop efficient movement in sport-specific movements
* types of training and training methods and their relevance for a variety of sports
* aspects that need to be considered when designing a training session for individual and group sports.

## Learning intentions and success criteria

**Explicit teaching note:** learning intentions and success criteria are most effective when they are contextualised to meet the needs of students in the class. The examples provided in this document are generalised to demonstrate how learning intentions and success criteria could be created.

Through these activities, students will:

* deepen their understanding of the biomechanics involved in an efficient spiking movement in volleyball
* recognise the key factors that contribute to sustained and efficient spiking to prevent injury
* consider aspects such as skill instruction and practise, and athlete reflection to improve shoulder mechanics in spiking for sustained movement and improved performance.

## Improving performance

Students research and summarise the correct body positions, footwork and arm swing techniques for spiking in volleyball.

Students are to present this information visually in a table, infographic or through a diagram. This will be displayed as part of a [gallery walk](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/555?clearCache=5119df23-fc95-941b-cc5a-e2b33f3ad7c2) for students to further refine their understanding of the technical requirements of spiking.

### Common volleyball spike errors and consequences

Students brainstorm as a class the potential errors in spiking technique, for example, improper arm positioning, mistimed jumps or inadequate follow-through.

In pairs, students are to explain how each error may negatively impact spiking performance or lead to injury. Sample answers are provided in Table 2.

Table 2 – common errors in spiking and potential consequences

|  |  |  |
| --- | --- | --- |
| Error | Impact on spike performance | Possible injury caused |
| Approach timing errors | A mistimed approach can result in poor coordination with the setter and a mistimed connection with the ball, leading to a less effective spike or a blocking opportunity for the opposing team. | Repeated mistimed approaches can lead to overexertion and impact-related injuries, such as shin splints or stress fractures. |
| Incorrect footwork | Poor footwork can result in a lack of balance and proper positioning for the spike, leading to inaccurate and less powerful hits. | Improper footwork can strain the knees, ankles and lower back, potentially causing overuse injuries or pain. |
| Inadequate arm swing | An ineffective arm swing can lead to a weak or off-target spike, making it easier for the opposing team to defend or counterattack. | Poor arm swing mechanics can strain the shoulder and elbow joints, increasing the risk of overuse injuries like rotator cuff problems or tennis elbow. |
| Lack of shoulder and hip rotation | Limited shoulder and hip rotation will reduce the range of motion, leading to less power and accuracy in the spike. | Inadequate rotation can strain the lower back and create imbalances in the body, potentially causing lower back pain or injury. |
| Hitting the ball too low or too high | Striking the ball too low can result in a net violation or easily defended shots, while hitting the ball too high can lead to out-of-bounds spikes. | Repeated high hits can strain the shoulder and elbow, while low hits can strain the wrist and forearm. |
| Lack of follow-through | An abrupt or incomplete follow-through can result in a less powerful spike with decreased control. | A lack of follow-through can lead to uneven muscle development and potentially impact the athlete’s overall performance. This is because kinetic energy is not dispersed leading to extra strain on joints and muscles as they absorb force. |

Explain to students that it has been estimated that the elite volleyball player performs as many as 40 000 spikes in a season. The mechanics of the arm swing and the distribution of overhead swings between practise and competition can put a significant load on the shoulder joint. The shoulder girdle is exposed to tremendous increasing load as the result of repetitive spiking and serving.

Taking a focus on arm swing and shoulder injuries in volleyball, watch [How to Increase Volleyball Arm Speed Fast](https://youtu.be/YDqRvb6b3fo?si=bWjIQJt1hutr1cMJ) (5:23) and [The most common hitting motion mistake – Tip of the Week #34](https://youtu.be/zDmhE3N2s1Q?si=Y3tT4C9fjuAhay7H) (4:20). As they watch, students make notes to answer the questions listed below.

* What are the 3 key components of the arm swing mechanics discussed in the video, and why are they important?
* Why do many young athletes experience shoulder and back pain when attempting to swing their arms in sports like volleyball, according to the video?
* How does the video suggest teaching and training athletes to enhance their arm mechanics and increase arm speed?
* What is the role of external shoulder rotation in the arm swing, as explained in the video?
* Why is it important to break down the arm swing into 3 distinct movements, as outlined in the video?
* What benefits can athletes expect to achieve by following the arm swing mechanics described in the video?
* How does understanding the science-based mechanics of the arm swing help prevent injuries and improve performance, according to the video?

Using your knowledge from the previous activity, suggest 3 ways a beginner volleyball player could develop efficient movement for sustained movement and improved performance when spiking. How might this advice differ for an elite athlete?

## Improving spiking action – practical application

Students revisit [Best Volleyball spiking drills for beginners](https://youtu.be/Vyk4K8R9CLM?si=Fpi0swr4ilBxj1Ja) ever (5:56) and in small groups, participate in the selected drills outlined in the video.

Students use their developed knowledge and understanding of efficient spiking techniques, to provide each other with feedback and corrections to help improve the biomechanics of their spiking technique to sustain movement and improve performance.

**Note:** to further support this activity, students could create a checklist for key factors to look for based on the videos they have previously watched.

Video recording and analysis of their own performance could be used to help students assess their own technique and identify areas for improvement. This could also support the delivery of syllabus content point:

* Examine the role technology can play to improve performance

# Learning sequence 3 – case study

Before undertaking this learning sequence, students should have demonstrated sound understanding of:

* the types of training and training methods and their relevance for a variety of sports
* application of the principles of training, progressive overload, training thresholds, reversibility, specificity, variety and warm-up and cool down
* aspects that need to be considered when designing a training session for individual and group sports.

## Learning intentions and success criteria

**Explicit teaching note:** learning intentions and success criteria are most effective when they are contextualised to meet the needs of students in the class. The examples provided in this document are generalised to demonstrate how learning intentions and success criteria could be created.

Through these activities, students will:

* apply their knowledge and understanding of how biomechanics can be used to develop efficient movements for sustained movement and improved performance
* create and/or modify training exercises, skills and drills to improve shoulder mechanics for sustained movement and improved performance.

## Case study

Students read the athlete profile below and complete the tasks that follow.

Jacqui, a 20-year-old volleyball player, holds a position as an outside hitter in the NSW’s U21s Volleyball team. With a 6-year background in volleyball, she initially demonstrated her talent as a proficient jumper on her school team. Jacqui’s commitment and skills have propelled her from school-level play to representing the state in the NSW team, thanks to her valuable experience with a local team at the State League.

During her club-level play, Jacqui maintained a once-a-week training regimen, consisting of a 90-minute session involving warm-up exercises, skill drills and game simulations, followed by weekend games. Her dedication led her to an invitation to attend a 3-day training camp where she intensified her training, dedicating 5 to 6 hours per day. From the training camp she was then selected for the NSW team.

In preparing for the national championships, Jacqui attended training 3 times a week. Two of these sessions, each lasting 2 hours, focused on refining skills, conducting drills and simulating game scenarios, while an additional one hour was allocated for strength and conditioning. She also continued her once-a-week training with her local club team.

During her rigorous training for the national championships, Jacqui developed shin splints. Fortunately, she sought a solution by wearing orthotics, which helped improve her foot and tibia alignment. Additionally, she had to contend with recurring lower back discomfort.

The national championships posed a demanding 5-day tournament structured in a round-robin format, culminating in playoff matches and a grand final which was won by the NSW team.

However, the aftermath of the national championships brought about a new challenge. Jacqui experienced significant discomfort in her right shoulder, which progressively worsened. She continued to compete for her club until her shoulder pain became debilitating. Subsequent medical evaluation revealed a strained rotator cuff and reduced rotation in her upper back, necessitating a 6-week period of rest and recovery.

### Questions

* Summarise the key physical challenges and injuries Jacqui faced during her volleyball journey, and explain how they have contributed to her current problem with her right shoulder.
* Explain how poor biomechanics could have contributed to Jacqui’s shoulder injury.
* What modifications in Jacqui’s training could be suggested, based on an understanding of biomechanics, to reduce the risk of future injuries and improve her overall performance as a state volleyball player?
* Identify and justify one strengthening exercise for the shoulder and one mobility exercise for the shoulder that Jacqui could use in her rehabilitation.
* Jacqui is ready to return to volleyball training with her club, after her 6-week rest and rehabilitation for injury. Using [Resource 2 – elite volleyball training session](#_Resource_2_–-), justify the considerations you, as the coach, will need to make to her first training session. In your answer consider:
* health and safety considerations
* overview/aim of the session (goal specific)
* warm-up and cool down
* skill instruction and practise
* conditioning
* strategies and tactics
* athlete reflection and/or coach evaluation.

**Formative assessment opportunity – outcome HM-12-04**

Students use their knowledge and understanding to answer the following question:

* Assess the importance of considering biomechanical principles when designing a training program for an individual.

# Resources

The following resources have been created to support the teacher of this learning sequence. All resources are suggested and should be reviewed to ensure they suit your student context.

## Resource 1 – glossary of biomechanical key words

Table 3 – glossary of terms

|  |  |
| --- | --- |
| Term | Definition |
| angular momentum | The rotational equivalent of linear momentum. |
| centre of mass | The middle of an object that serves as the point from which gravity is acting on.It is also the centre of an object’s rotational movement. |
| force | The push or pull acting on a body. |
| inertia | Resistance of an object to change its state of motion. |
| ipsilateral rotation | Twisting action of the torso over an axis. |
| kinetic chain | The interrelated groups of body segments, connecting joints and muscles working together to perform movements and the portion of the spine to which they connect. |
| kinetic energy | Energy possessed by an object or person due to its motion. |
| Magnus effect | The influence of rotation on the trajectory of a spinning object, such as a ball moving through the air. |
| momentum | The mass of the body traveling in a straight or curved line multiplied by the velocity of it. |
| potential energy | Energy stored in the body due to its current position. In this example, the current position is moving forward and preparing to jump. |
| propel | The action of pushing or moving something through space. |
| propulsive force | The external force that acts to cause motion in a body. |
| velocity | The displacement of the body divided by the time taken. |
| vertical velocity | Speed and direction in the vertical plane. |

## Resource 2 – elite volleyball training session

**Objective:** enhance team cohesion, improve individual skills and refine strategic gameplay for heightened performance.

**Duration:** one hour

Table 4 – elite volleyball training session

|  |  |
| --- | --- |
| Phase | Activities |
| Warm-up(10 minutes) | * Dynamic stretching – arm circles, leg swings, lunges and torso twists.
* Jogging and light sprinting to get the blood flowing.
* Ball control drills – passes, sets and spikes in pairs or small groups.
 |
| Skill development(20 minutes) | * Serving technique
* Focus on various serves – float, jump float, topspin and jump serve.
* Emphasise accuracy, speed and placement.
* Defensive drills
* Dive and roll technique.
* Blocking footwork and timing.
* Hitting and blocking
* Work on approach, timing and power in hitting.
* Blocking strategies – reading the setter, closing the block and redirecting the ball.
 |
| Team strategy(15 minutes) | * Setter-hitter connection
* Setter’s decision-making under pressure.
* Hitter’s positioning and readiness for quick sets and back-row attacks.
* Communication
* Verbal and non-verbal cues for effective on-court communication.
* Assigning responsibilities during plays (for example, calling shots, covering blocks).
* Transition play
* Quick transition from defence to offense.
* Maintaining readiness and positioning after rallies.
 |
| Game simulation(10 minutes) | * Scrimmage – divide the team into 2 sides and play a controlled scrimmage.
* Focus on implementing the strategies and skills learned during the session.
* Rotate players to ensure everyone gets playing time in various positions.
 |
| Cool down and reflection(5 minutes) | * Gentle stretching to prevent muscle soreness and promote flexibility.
* Team reflection – discuss what went well, areas for improvement and key takeaways from the session.
* Set individual and team goals for the next training session.
 |

# Additional information

The information below can be used to support teachers when using this teaching resource for Health and movement science.

## Support and alignment

**Resource evaluation and support:** all curriculum resources are prepared through a rigorous process. Resources are periodically reviewed as part of our ongoing evaluation plan to ensure currency, relevance and effectiveness. For additional support or advice contact the PDHPE Curriculum team by emailing PDHPEcurriculum@det.nsw.edu.au.

**Differentiation:** further advice to support Aboriginal and/or Torres Strait Islander students, EAL/D students, students with a disability and/or additional needs and High Potential and gifted students can be found on the [Planning, programming and assessing 7–12](https://education.nsw.gov.au/teaching-and-learning/curriculum/planning-programming-and-assessing-k-12/planning-programming-and-assessing-7-12) webpage. This includes the [Inclusion and differentiation advice 7–10](https://education.nsw.gov.au/teaching-and-learning/curriculum/planning-programming-and-assessing-k-12/planning-programming-and-assessing-7-12/inclusion-and-differentiation-advice-7-10) webpage.

**Assessment**: further advice to support formative assessment is available on the [Planning, programming and assessing 7–12](https://education.nsw.gov.au/teaching-and-learning/curriculum/planning-programming-and-assessing-k-12/planning-programming-and-assessing-7-12) webpage.

**Explicit teaching:** further advice to support explicit teaching is available on the [Explicit teaching](https://education.nsw.gov.au/teaching-and-learning/curriculum/explicit-teaching) webpage. This includes the CESE [Explicit teaching – Driving learning and engagement](https://education.nsw.gov.au/about-us/education-data-and-research/cese/publications/research-reports/what-works-best-2020-update/explicit-teaching-driving-learning-and-engagement) webpage.

**Alignment to system priorities and/or needs:** [School Excellence Policy](https://education.nsw.gov.au/policy-library/policies/pd-2016-0468), [Our Plan for NSW Public Education](https://education.nsw.gov.au/about-us/strategies-and-reports/plan-for-nsw-public-education).

**Alignment to the School Excellence Framework:** this resource supports the [School Excellence Framework](https://education.nsw.gov.au/inside-the-department/directory-a-z/strategic-school-improvement/school-excellence-framework) elements of curriculum (curriculum provision) and effective classroom practice (lesson planning, explicit teaching).

**Alignment to Australian Professional Teaching Standards:** this resource supports teachers to address [Australian Professional Teaching Standards](https://educationstandards.nsw.edu.au/wps/portal/nesa/teacher-accreditation/meeting-requirements/the-standards/proficient-teacher) 3.2.2, 3.3.2.

**Consulted with:** Curriculum and Reform and subject matter experts

**NSW syllabus:** Health and Movement Science 11–12 Syllabus

**Syllabus outcomes:** HM-12-04, HM-12-09, HM-12-10

**Author:** PDHPE Curriculum Team

**Publisher:** State of NSW, Department of Education

**Resource:** Learning program

**Related resources:** further resources to support health and movement science Stage 6 can be found on the [Planning, programming and assessing PDHPE 11-12](https://education.nsw.gov.au/teaching-and-learning/curriculum/pdhpe/planning-programming-and-assessing-pdhpe-k-12/planning-programming-and-assessing-pdhpe-11-12) curriculum webpage and the [PDHPE statewide staffroom](https://teams.microsoft.com/l/team/19%3A93bb42a54e4b4779b28ab5b737b9e642%40thread.tacv2/conversations?groupId=d759a943-a680-4d0b-bdfe-88a8998f709e&tenantId=05a0e69a-418a-47c1-9c25-9387261bf991).

**Professional learning:** relevant professional learning is available through the [PDHPE statewide staffroom](https://teams.microsoft.com/l/team/19%3A93bb42a54e4b4779b28ab5b737b9e642%40thread.tacv2/conversations?groupId=d759a943-a680-4d0b-bdfe-88a8998f709e&tenantId=05a0e69a-418a-47c1-9c25-9387261bf991).

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[Health and Movement Science 11–12 Syllabus](https://curriculum.nsw.edu.au/learning-areas/pdhpe/health-and-movement-science-11-12-2023/overview) © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2023.

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