

GRADE NINE

Students in grade nine complete the transition from modified versions of movement forms to more complex applications across all types of physical activities. This may include fitness activities, dance and rhythmic activities, aquatics, individual performance activities, and games and sports (net/wall, striking/fielding, and goal/target). Students demonstrate the ability to use basic skills, strategies, and tactics in a variety of lifetime physical activities. Students demonstrate more specialized knowledge in identifying and applying key movement concepts and principles. Students will explain the importance of energy balance and the nutritional needs of the body to maintain optimal health and prevent chronic disease. They self-assess their skill performance and develop a personal physical activity program aimed at improving motor skills, movement patterns, and strategies essential to performing a variety of physical activities. They apply their understanding of personal fitness to lifelong participation in physical activity. Students demonstrate independence in making choices, respecting others, avoiding conflict, resolving conflicts appropriately, and using elements of fair play and ethical behavior in physical activity settings. Students demonstrate the knowledge, skills, and abilities required to plan for and improve components of fitness and achieve and maintain a health-enhancing level of personal fitness.

Motor Skill Development

- 9.1 The student will perform all basic movement skills and demonstrate movement and biomechanical principles in a variety of activities that may include outdoor pursuits, fitness activities, dance and rhythmic activities, aquatics, individual performance activities, and games and sports (net/wall, striking/fielding, and goal/target[s]).
- a) Demonstrate proficiency and refinement in locomotor, non-locomotor, and manipulative skills through appropriate activities (e.g., orienteering, rock climbing, cycling, disc golf, lifetime activities, fitness activities, dance and rhythmic activities, aquatics, individual performance activities, games and sports [net/wall, striking/fielding, and goal/target]).
 - b) Design, implement, evaluate, and modify a practice plan for a self-selected skill, including the motor learning process of analysis of performance, application of principles of movement and training, goal setting, and improvement of personal skills through practice, correction, practicing at a higher level, and reassessment.

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<p>Motor skill development includes combining and applying movement and manipulative skills to changing physical activity/game situations. (9.1.a)</p> <ul style="list-style-type: none"> • Proficiency and refinement include performance of all critical elements required by the activity, exercise or dance. <ul style="list-style-type: none"> ○ Activities may include small-sided modified games, modified sports, and other physical activities (e.g., orienteering, rock climbing, cycling, disc golf, lifetime activities, fitness activities, dance and rhythmic activities, aquatics, individual performance activities, games and sports [net/wall, striking/fielding, and goal/target]). ○ Critical elements may include proper grip/use of equipment, proper form/body positioning, balance, coordination, adequate speed/intensity of movement, opposition, footwork, and passing/receiving skills. ○ See K.1, 1.1, 2.1, 3.1, 4.1 and 5.1 for specific critical elements for locomotor, non-locomotor, and manipulative skills. <p>Movement/motor learning progression includes analysis of current performance, development of a personalized practice plan for improvement that includes SMART goal setting, application of principles of movement and training, and planning for amount of time and activities needed for practice, correction, practicing at a higher level, and reassessment. (9.1.b)</p> <ul style="list-style-type: none"> • Evaluation of performance can come from oneself, peers or a specialist such as a coach or teacher and can include skills checklists, verbal or written feedback, and formal analysis of task performance. • Goal setting should take the form of SMART goal setting in order to be specific, measurable, achievable, realistic and time-sensitive. 	<p>In order to meet these standards, it is expected that students will</p> <ul style="list-style-type: none"> • demonstrate proficiency (all critical elements) in a variety of activities (9.1.a); • evaluate performance of a variety of locomotor, non-locomotor, and manipulative skills using a skills checklist (9.1.a, 9.1.b); • analyze current performance for a variety of locomotor, non-locomotor, and manipulative skills (9.1.a, 9.1.b); • design, implement, evaluate, and modify a practice plan for a self-selected skill using SMART goal-setting methods (9.1.b); • apply principles of movement and training to a personal practice plan (9.1.b); • produce written and oral feedback on a variety of tasks/activities (9.1.b); • identify activities needed for practice within a personal fitness plan (9.1.b). <p>Additional resources: SHAPE America National Standards and Grade-Level Outcomes OpenPhyzed Health Smart Virginia PE Central Dynamic PE ASAP</p>

Anatomical Basis of Movement

- 9.2 The student will explain the structures and functions of the body and how they relate to and are affected by human movement.
- a) Analyze and evaluate proficient and efficient movement in relation to how movement is directed, including the type of muscle action that directs a movement (concentric, eccentric, and isometric), the direction the body part moves relative to its joints (abduction, adduction, flexion, and extension), and planes of motion.
 - b) Describe the relationship between the endocrine system and the body’s metabolic response to short- and long-term physical activity.
 - c) Explain the body’s response to the principles of specificity, overload, and progression (SOP) in relation to frequency, intensity, time, and type of exercise (FITT).
 - d) Explain the anaerobic respiration (ATP-PC and lactic acid system) and aerobic respiration systems used for energy during activity.
 - e) Analyze movement performance and use feedback to learn or to improve the movement skills of self and others.
 - f) Apply the concepts and principles of levers, force, motion, and rotation to a variety of activities.
 - g) Apply biomechanical principles of balance, energy, and types of muscle contractions to a variety of activities.

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<p>When the body is moving or producing movement, it obeys the same physical laws that apply to all types of motion. The type of muscle action and the direction a body part moves in relation to its joints is important for proficient and efficient movement. (9.2.a)</p> <ul style="list-style-type: none"> • Muscle actions: <ul style="list-style-type: none"> ○ Concentric contraction (positive contraction): Contraction that shortens the muscle as it acts against a resistive force (biceps curl: bicep muscles shorten as the weight is pulled toward the body). ○ Eccentric contraction (negative contraction): Contraction that lengthens the muscle as it produces force (lowering the weight during biceps curl lengthens the bicep muscles as the weight is lowered back to a resting position; force is produced by the biceps) 	<p>In order to meet these standards, it is expected that students will</p> <ul style="list-style-type: none"> • evaluate different types of muscle contractions (concentric, eccentric, and isometric) (9.2a); • evaluate planes of motion within different physical movements to identify proficient and efficient movement (9.2.a); • demonstrate how the body moves relative to its joints while participating in physical activities (9.2.a);

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<p>to allow for a controlled return to a resting position as opposed to allowing gravity to pull the weight down)</p> <ul style="list-style-type: none"> - How much time is spent in each phase (concentric and eccentric contractions) will affect results. Concentrating on eccentric contractions at higher weights is referred to as negative training. - Isometric muscle contraction without appreciable shortening or change in distance between its origin and insertion. <ul style="list-style-type: none"> • Movement of body part in relation to its joints: <ul style="list-style-type: none"> ○ Abduction: Muscle contraction without appreciable shortening or change in distance between its origin and insertion. ○ Adduction: Movement of a body part toward the median plane (of the body, in the case of limbs; of the hand or foot, in the case of digits). ○ Flexion: Bending movement around a joint in a limb (such as knee or elbow) that decreases the angle between the bones of the limb at the joint. ○ Extension: An unbending movement around a joint in a limb that increases the angle between the bones of the limb at the joint. • Planes of motion <ul style="list-style-type: none"> ○ Sagittal plane: Vertical plane passing from the rear (posterior) to the front (anterior), dividing the body into left and right halves. It is also known as the anteroposterior plane. Most sport and exercise movements that are almost two-dimensional, such as running, long jumping, biking and rowing, take place in this plane. ○ Frontal plane: Vertical and passes from left to right, dividing the body into posterior and anterior halves (front and back). When 	<ul style="list-style-type: none"> • explain how types of muscle contractions and force are used to improve skills and performance (9.2.a); • explain metabolism and the body’s metabolic response to exercise (9.2.b); • apply and explain how the body makes energy to move in activity of short duration and activity of long duration (9.2.b); • explain the body’s response to the principles of specificity, overload, and progression (SOP) in relation to frequency, intensity, time, and type of exercise (FITT) (9.2.c) ; • explain the anaerobic respiration and aerobic respiration systems used for energy during activity (9.2.d); • provide evidence of the use of feedback to learn or to improve the movement skills (9.2.e); • demonstrate how to provide feedback to help others learn or improve movement skills (9.2.e); • analyze the performance of a peer and provide appropriate and meaningful feedback to help them learn or improve a skill (9.2.e);

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<p>moving along this plane, we are moving toward or away from the midline. Adduction and abduction are movements along this plane.</p> <ul style="list-style-type: none"> ○ Transverse plane: Divides the body into top (superior) and bottom (inferior) halves. Any time we rotate a joint we are moving along the transverse plane. • Efficient movement can be exemplified by, but not limited to <ul style="list-style-type: none"> ○ technique and fitness in running; ○ quickness and effort in tennis; ○ speed and control in a golf swing. • Analyzing movement example (9.2.a) <ul style="list-style-type: none"> ○ Tennis serve <ul style="list-style-type: none"> ▪ Ball toss with non-dominant hand: concentric contraction of the deltoid as the arm/ball is raised, abduction and flexion at the shoulder ball and socket joint; after ball is released: eccentric contraction of deltoid, adduction and extension of the shoulder joint; motion occurs in the sagittal plane. ▪ Racquet swing: occurs in the transverse plane (twisting motion); involves hinge joints – knees and elbow, ball and socket joints – hips and shoulders, condyloid synovial (also called ellipsoidal) joint (modified ball and socket that allows for circular motion, flexion, and extension) – wrist; abduction and adduction and flexion and extension occur during joint movements for a tennis serve. <p>Multiple body systems are involved in producing energy during physical activity. The endocrine system consists of glands and organs. It uses hormones to control the body’s metabolism. (9.2.b)</p> <ul style="list-style-type: none"> • The endocrine system releases hormones into the bloodstream. This lets 	<ul style="list-style-type: none"> • demonstrate efficient body movements along the correct planes of the body (9.2.f); • apply the concept of force, motion, and rotation during a physical activity and explain its effect on performance (9.2.f); • explain how levers, types of muscle contractions, and force are used to improve skills and performance (9.2g); • analyze movement performance and identify anatomical movements around the planes of the body (9.2g); • demonstrate the use of levers, force, motion, and rotation in a variety of activities (9.1.f). <p>Additional resources: SHAPE America National Standards and Grade-Level Outcomes OPEN Online Physical Education Network Health Smart Virginia PE Central Dynamic PE ASAP KidsHealth.org</p>

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<p>the hormones travel to cells in other parts of the body.</p> <ul style="list-style-type: none"> • Hormones help control mood, growth and development, the way our organs work, <i>metabolism</i>, and reproduction. • The endocrine system includes multiple glands and organs. <ul style="list-style-type: none"> ○ Hypothalamus: located in the lower-central part of the brain; links the endocrine system and nervous system; hypothalamus regulates the pituitary gland ○ Pituitary: gland at the base of the brain; often called the “master gland” ○ Thyroid: in the front part of the lower neck; releases hormones that control the rate at which cells burn fuels from food to make energy ○ Parathyroids: four tiny glands attached to the thyroid; releases hormone that controls the level of calcium in the blood. ○ Adrenals: on the kidneys ○ Adrenal cortex: releases hormones that help control salt and water balance, the body’s response to stress, metabolism, the immune system, and sexual development and function ○ Adrenal medulla: releases epinephrine (aka adrenaline), which increases blood pressure and heart rate when the body is under stress ○ Pineal body/gland: in the middle of the brain; secretes melatonin (hormone that helps regulate sleep) ○ Reproductive glands (ovaries, testes) ○ Pancreas: makes insulin and glucagon, hormones that control the level of glucose (sugar) in the blood ○ Insulin helps keep the body supplied with stores of energy. The body uses this stored energy for exercise and activity, and helps 	

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<p style="text-align: center;">organs function properly</p> <p>Metabolism is the breakdown of food (chemical reactions of the body cells) and its transformation into energy. (9.2.b)</p> <ul style="list-style-type: none"> • Digestive system uses enzymes to break down proteins into amino acids, turn fats into fatty acids, and turn carbohydrates into simple sugars (glucose). The body uses sugar/glucose, amino acids, and fatty acids as energy sources. These compounds are absorbed into the blood, which carries them to the cells. • Metabolism consists of anabolism (the buildup of substances) and catabolism (the breakdown of substances). <p>The intensity and duration of exercise determines which fuel source is used: (9.2b, 9.2.d)</p> <ul style="list-style-type: none"> • Fat metabolism is a slow process and so can only be used as fuel for exercise at less than 60% VO₂ max. • Carbohydrate is a much faster fuel source and so can be used for exercise up to 80% VO₂ max (in trained individuals). • Carbohydrate stores within the muscle and liver can fuel exercise for up to 80 minutes. As carbohydrate stores lower, the body has to rely more and more on fat stores. • Onset of exercise: breakdown of muscle glycogen stores to produce glucose for anaerobic glycolysis. • Blood flow to muscle is increased, allowing for increased uptake of glucose by muscle. • Exercising at about half the maximum aerobic capacity requires a 50/50 mixture of glucose and free fatty acids, with amino acid oxidation still 	

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<p>supplying 1-2% of the energy.</p> <ul style="list-style-type: none"> • Exercising at higher levels, about 75% of maximum aerobic capacity or greater, muscles become progressively more dependent on glucose oxidation rather than on fatty acid oxidation (National Center for Biotechnology Information). • Body stores calories (a calorie is a unit that measures how much energy a particular food provides to the body). Calories that are not used by the body for functions and through exercise are stored primarily as fat which can lead to overweight and obesity. <p>A metabolic response is any reaction by the body to a specific influence or impact. Metabolism is a general term describing the organic process in any cellular structure. (9.2.b)</p> <ul style="list-style-type: none"> • A metabolic response can occur with respect to individual cells, a gland, an organ, or a process such as the cardiovascular system. • Metabolism is often understood in terms of the metabolic rate, which is the amount of energy expended by the body in a given period. • Metabolism is also a variable in the assessment of human performance. • Metabolic function is subject to such individual factors as age, heredity, gender, level of physical fitness and others. The body may exhibit a metabolic response to any type of external factor or change. <p>Changes in the physical intensity or duration of activity will generate a metabolic response. (9.2.b)</p> <ul style="list-style-type: none"> • This response is particularly evident when assessing the nature of muscle composition in an athlete. • When an athlete seeks to improve endurance ability, the training program will correspondingly focus on endurance exercise. 	

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<ul style="list-style-type: none"> • The muscle groups involved in the generation of power in the exercise, each with a set pattern of distribution between fast-twitch and slow-twitch fibers, will respond by making a slight adaptation in which more fast-twitch fibers are used for the muscle. <p>The principles of overload, specificity and progression are highly interconnected and are reciprocally dependent on each other in order to see performance improvement. (9.2.c)</p> <ul style="list-style-type: none"> • Specificity: desired adaption occurs in response to specific stress placed upon the body (FITT) • Overload: stress must be applied beyond that which the body is accustomed to; increase workload (added weight, time (FITT), intensity (FITT), and/or repetitions (or how often FITT)) • Progression: Once the body has adapted to a level of stress, additional stress is needed; progressively or gradually increase workload (frequency, intensity, and time can impact progression, FITT). <p>To improve fitness or skill performance, the body must be overloaded in a safe and progressive manner. (9.2.c)</p> <p>Two respiration systems are used by the body for energy and the systems are dependent upon the duration of the activity. (9.2.d)</p> <ul style="list-style-type: none"> • Anaerobic respiration system (ATP-PC and Lactic Acid System; works without oxygen; adenosine triphosphate [ATP – energy carrying molecule] and phosphocreatine [PC]) <ul style="list-style-type: none"> ○ To immediately meet the sudden higher energy demand, stored ATP is the first energy source. This lasts for approximately 2 seconds. 	

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<ul style="list-style-type: none"> ○ The ATP-PC system can only last 8-10 seconds before PC stores are depleted. ○ The lactic acid system (anaerobic glycolysis) must then take over as the predominant source of energy production; high intensity (but sub-maximal) exercise can last for between 3 and 5 minutes using this system. ○ If the exercise continues at a high intensity, oxygen is not available at a fast enough rate to allow aerobic metabolism to take over. The production of lactic acid will reach the point where it interferes with muscular function; this is called the lactate threshold. ○ Muscles begin to fatigue when ATP resynthesizes can no longer match demand. • Aerobic respiration system <ul style="list-style-type: none"> ○ Also known as aerobic glycolysis: breakdown of carbohydrates to produce ATP; slow, uses carbohydrates or fat (carbohydrates and fats are only burned in presence of oxygen); needs oxygen to produce ATP; sustained energy; longer-duration, lower-intensity after anaerobic systems have fatigued; long-term steady paced exercise and day-to-day activities; produced large amounts of energy at the lowest intensity. <p>Feedback is important to master advanced skills. (9.2.e)</p> <ul style="list-style-type: none"> • Feedback is useful when it is focused on the goal of the skill and is specific, objective and provided in terms understood by the recipient of the feedback. Feedback is goal-referenced; tangible and transparent; actionable; user-friendly (specific and personalized); timely; ongoing; and consistent. 	

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<ul style="list-style-type: none"> • When analyzing movements, divide the movement performance into three phases: <ul style="list-style-type: none"> ○ Preparatory: Movements that prepare, such as a backswing in golf or tennis. ○ Execution: <ul style="list-style-type: none"> - Force-producing movements, such as the forward motion of the tennis forehand shot. - Critical instant, the point of contact or the release, such as the moment of contact in the tennis serve or the takeoff in the long jump. ○ Follow-through: Body movements after the execution where the movement slows down, such as the high leg lift after kicking a goal or the golf club after the ball is struck. • Note: movement skill phases may not all fit neatly into three phases and additional phases may be devised or added. <p>When the body is moving or producing movement, it obeys the same physical laws that apply to all types of motion. Biomechanics is the field of sports science that applies the laws of mechanics and physics to human performance to gain a greater understanding of forces and the effects of those forces on and within the human body, and therefore improve physical performance of a skill or activity. (9.2.f)</p> <ul style="list-style-type: none"> • Levers – Consist of a pivot point (fulcrum), lever arm, and weight/resistance. <ul style="list-style-type: none"> ○ Example of lever in sport is the use of a tennis racket. The player’s hand is the pivot point/fulcrum, the lever arm is the racket, and the resistance is the ball. The longer the racket, the more force you can 	

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<p>exert on the ball.</p> <ul style="list-style-type: none"> • Force is strength or energy exerted; force causes movement. • Newton’s laws of motion <ul style="list-style-type: none"> ○ Inertia: An object at rest or in motion will stay in that state until acted upon by a force strong enough to change its state of motion. Example: <ul style="list-style-type: none"> ▪ Tennis serve: tennis ball does not leave the hand unless force is applied to toss it upward; the tossed ball moves upward until gravity (force) or a racquet strike (force) is applied to change the direction of the tossed ball. ○ Acceleration/Momentum: acceleration of an object is directly proportionate to the amount of force applied and moves in the direction in which the force is applied. Example: <ul style="list-style-type: none"> ▪ The speed of a served tennis ball will vary according to the amount of force applied to the ball with the racquet and according to the weight of the ball (on a humid day, the ball absorbs moisture and will need additional force to achieve the desired speed/acceleration of a tennis ball compared with a tennis ball used on a dry/low-humidity day). Professional tennis players achieve service speeds of 120-150 mph. ○ Action and reaction: For every action there is an equal and opposite reaction. Example: <ul style="list-style-type: none"> ▪ Force that the ball exerts on the racket is equal and opposite of the force that the racket exerts on the ball. • Rotation: the action or process of rotating on or as if on an axis or center; a force must produce a torque to change the rotation of a body, which changes its angular momentum. Example: 	

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<ul style="list-style-type: none"> ○ Backspin on a tennis ball (strike below the center of the mass) keeps the ball’s trajectory low, tends to move the ball right to left and stays low when it bounces. ○ Topspin on a tennis ball (strike above the center of the mass; racquet moves from low to high; windshield wiper motion) rotates the ball forward in the air, increasing the speed of the ball and causing it to dip toward the ground. This decreases the distance traveled (hits the ground sooner) and increases its speed as it hits the ground, travels faster and low to the ground. <p>Biomechanical principles of balance and strength are crucial to the performance of motor skills. (9.1.g)</p> <ul style="list-style-type: none"> • Balance: an even distribution of weight that enables someone or something to remain upright while remaining stable and achieving equilibrium. The ability to maintain the body’s center of gravity within the limits of stability as determined by the base of support. (9.2.g) <ul style="list-style-type: none"> ○ Center of gravity is the point at which all of the body’s mass and weight are equally balanced or equally distributed in all directions (in the body it is slightly higher than the waist). ○ An individual’s limits of stability is the distance outside their base of support that they can go without losing control of the center of gravity. ○ Base of support: The surface supporting the body and points of contact with that surface (when standing, the position of the feet on the ground). ○ The lower the center of gravity to the base of support, the greater the stability. 	

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<ul style="list-style-type: none">○ The nearer the center of gravity to the center of the base of support, the more stable the body.○ Stability is increased with the number of points of contact (two feet vs. one foot).○ Dynamic activities can also be described as those that cause the center of gravity to move in response to muscular activity.	

Fitness Planning

- 9.3 The student will evaluate current fitness behaviors and demonstrate achievement and maintenance of a health-enhancing level of personal fitness by designing, implementing, self-assessing, and modifying a personal fitness program.
- a) Demonstrate program-planning skills by assessing and analyzing personal fitness levels, setting goals, devising strategies, making timelines for a personal physical fitness plan, and evaluating the components and progress of the personal fitness plan.
 - b) Apply the FITT (frequency, intensity, time, type of exercise) principle and other principles of training, such as specificity, overload, and progression, in accordance with personal goals to the personal fitness plan.
 - c) Explain the characteristics, including scientific principles and concepts, of safe and appropriate muscular-stretching, muscular-strengthening, and cardiorespiratory exercise programs to improve the health-related components of fitness.
 - d) Calculate and explain the relationship between resting heart rate, target heart rate, recovery heart rate, blood pressure, training zones, and exercise intensity, including measurement devices (e.g., heart rate monitors, pedometers, accelerometers) to meet exercise and personal fitness goals.
 - e) Demonstrate appropriate techniques and describe the benefits of resistance-training activities, machines, and/or free weights.
 - f) Use the scientific process to analyze and compare resources, including available technology, to evaluate, monitor, and record activities for fitness improvement.
 - g) Identify types of strength exercises (isometric, concentric, eccentric) and stretching exercises (static, proprioceptive neuromuscular facilitation, dynamic) for personal fitness development (e.g., strength, endurance, range of motion).
 - h) Define and describe terms and activities associated with fitness, including *set*, *repetition*, *isometric*, *isotonic*, *isokinetic*, *core*, and *upper-body exercises* and *lower-body exercises*.
 - i) Apply physiological principles of warm-up, cool down, overload, specificity, and progression.

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Physical literacy includes the ability to plan, implement, evaluate, and modify a personal, goal-driven fitness plan that enables students to achieve and maintain the level of fitness needed to meet their personal goals for various work-related, sport, and leisure activities. (9.3.a) Health-related fitness components provide information about a person’s	In order to meet these standards, it is expected that students will <ul style="list-style-type: none"> • evaluate personal fitness levels and analyze the results to determine areas to improve/maintain. (9.3a);

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<p>overall physical health. (9.3.a)</p> <ul style="list-style-type: none"> • Cardiorespiratory endurance: the ability of the cardiovascular system (heart, blood, blood vessels) and respiratory system (lungs, air passages) to deliver oxygen and other nutrients to the working muscles and to remove wastes. Tests that involve running (e.g., 20-meter shuttle run test), cycling and swimming can be used to measure this fitness component. Activities vary in intensity level: <ul style="list-style-type: none"> ○ Light activities are physical activities that involve large muscle groups. While engaging in light activities, people begin to notice their breathing, but they can still talk fairly easily. ○ Moderate activities are physical activities that cause breathing and heart rate to increase. People engaging in moderate activities can hear themselves breathe, but they can still talk. ○ Vigorous activities are physical activities that cause breathing and heart rate to increase to a higher level, making it difficult to talk. • Muscular strength is the ability of a muscle or a group of muscles to exert force for a brief period of time. Strength of different muscles can be measured by having a person perform weightlifting exercises and determining the maximum amount of weight the person can lift. A person’s strength can be expressed as absolute strength (the actual weight lifted) or as relative strength (the weight lifted, divided by the person’s body weight). • Muscular endurance is the ability of a muscle or a group of muscles to sustain repeated contractions or to continue applying force against a fixed object. Push-ups and curl-ups are often used to test muscular endurance. The person’s endurance is expressed as the number of repetitions completed without stopping for a set period of time (often 	<ul style="list-style-type: none"> • create SMART personal fitness goals based on fitness assessment data results (9.3a); • create and implement personal physical fitness plans (9.3.a); • apply FITT and SOP to personal physical fitness plans (9.3.b); • explain the characteristics of safe and appropriate muscular-stretching, muscular-strengthening, and cardiorespiratory exercise programs (9.3.c); • calculate resting heart rate, target heart rate, recovery heart rate, and blood pressure (9.3.d); • explain the relationship between heart rate, training zones, and exercise intensity, including a variety of measures (9.3.d,f); • explain the effects of heart rate, training zones, and exercise intensity on meeting personal fitness goals (9.3d); • demonstrate appropriate techniques for resistance-training activities, machines, and/or free weights (9.3.e); • understand how to use the scientific process to analyze my fitness improvement (9.3.f); • identify and demonstrate types of strength exercises and stretching exercises (9.3.g); • define and describe terms and activities

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<p>one minute).</p> <ul style="list-style-type: none"> Flexibility is the ability to move joints through their full range of motion. The sit-and-reach test is a good measure of flexibility of the lower back and the backs of the upper legs (hamstrings). A person’s flexibility is usually expressed in how far a joint can be moved or the degrees through which a joint can be moved. Body composition refers to the makeup of the body in terms of lean mass (muscle, bone, vital tissue and organs) and fat mass. Good body composition has strong bones, adequate skeletal muscle size, a strong heart, and a low amount of fat mass. Regular physical activity and exercise will help decrease body fat and increase or maintain muscle mass, increase bone mass and improve heart function. Although body composition entails muscle, bone and fat, it is often expressed only as percentage of body fat. Many types of tools can be used to assess body composition, including skinfold calipers, bioelectrical impedance analyzers (found in many weigh scales), body mass index (BMI), underwater weighing, and dual energy X-ray absorptiometry. Improving in these four health-related fitness areas will increase lean body mass (stronger bones and muscle) and decrease fat mass and therefore significantly affect body composition. Improvements will also reduce risk of disease and improve work capacity. <p>Personal fitness planning includes: (9.3.a)</p> <ul style="list-style-type: none"> assessing and analyzing personal fitness levels; setting SMART goals for improvement and/or maintenance; creating strategies to achieve goals and monitor progress; plan for reassessing, evaluating, and reflecting on progress of goals; 	<ul style="list-style-type: none"> associated with fitness (9.3.h); describe the physiological principles for warm-up, cool down, specificity, overload, and progression. (9.3.i); perform a proper warm-up and cool down in the personal fitness plan (9.3.i); demonstrate specificity, overload, and progression (SOP) in the personal fitness plan (9.3i). <p>Additional resources: SHAPE America National Standards and Grade-Level Outcomes KidsHealth.gov Health Smart Virginia MyPlate.gov OpenPhySED Physical Activity Guidelines for Americans, 2nd ed. Healthy Children.org</p>

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<ul style="list-style-type: none"> • revising plan strategies as needed; • applying FITT and SOP to plan. <p>The principles of specificity, overload, and progression (SOP) are highly interconnected and are reciprocally dependent on one another. (9.3.b)</p> <ul style="list-style-type: none"> • Specificity: desired adaption occurs in response to specific stress placed upon the body; exercise/activity needs to match desired outcome. • Overload: stress must be applied beyond that which the body is accustomed to; increase workload (added weight, time, intensity, and/or repetitions). • Progression: once the body has adapted to a level of stress, additional stress is needed; progressively or gradually increase workload. <p>The FITT principles for improvement of personal fitness are important when developing a personal fitness plan. (9.3.b)</p> <ul style="list-style-type: none"> • FITT principle <ul style="list-style-type: none"> ○ Frequency: How often; commonly measured in days per week. For each component of health-related fitness, a safe frequency is three to five times a week. ○ Intensity: How hard; commonly measured in intensity levels. Intensity can be measured in different ways, depending on the connected health-related component. For example, monitoring heart rate is one way to gauge intensity during aerobic endurance activities. ○ Time: How long; commonly measured in minutes/hours. Time varies depending on the health-related fitness component targeted. For example, flexibility or stretching may take 10-30 seconds for each stretch, while the minimum time for performing aerobic activity is 15 minutes of continuous activity. 	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> ○ Type: What kind; measured in specific health-related component of fitness. For example, an individual wishing to increase arm strength must exercise the triceps and biceps, while an individual wishing to increase aerobic endurance needs to jog, run, swim, or perform some other aerobically challenging activity. • Personal fitness planning includes: (9.3.b) <ul style="list-style-type: none"> ○ assessing and analyzing personal fitness levels; ○ setting SMART goals for improvement and/or maintenance; ○ creating strategies to achieve goals and monitor progress; ○ plan for reassessing, evaluating, and reflecting on progress of goals; ○ revising plan strategies as needed; ○ applying the FITT and SOP principles to plan. <p>Muscular-stretching raises the body’s internal temperature through light physical activity before engaging in activity. (9.3.c)</p> <ul style="list-style-type: none"> • Active stretch: the person stretching applies the force of the stretch • Passive: resistance by a chair, towel, machine or a partner provides the force of the stretch; carries some risk • Static: slow and constant with end position held; caution is exercised with proper technique • Ballistic: bouncing-type movement; not recommended for health-related fitness • Dynamic: flexibility during sport-specific movements; avoids bouncing, such as a track sprinter performing long walking strides for a warmup focused on hip extension. • Reflex-assisted: such as plyometric; higher injury risk, not 	

Essential Understandings	Essential Knowledge and Skills
<p>recommended for health-related fitness.</p> <ul style="list-style-type: none"> • Proprioceptive neuromuscular facilitation (PNF): Technique that combines passive and isometric stretching; a muscle group is passively stretched, then contracts isometrically against resistance while in the stretched position and then is passively stretched again through the resulting increased range of motion; use of a partner to provide resistance against the isometric contraction and then later to passively take the joint through its increased range of motion. May be done without a partner, such as using a towel; muscles need to be warmed up first. <p>Muscular strengthening and cardiorespiratory exercises are important when improving overall fitness. (9.3.c)</p> <ul style="list-style-type: none"> • Muscular strengthening <ul style="list-style-type: none"> ○ Training or resistance training: systematic program of exercises designed to increase an individual’s ability to resist or exert force. (9.3e,g) ○ Free weights, weight machines, resistance bands, plyometric exercise, callisthenic exercises, Pilates, yoga, martial arts, circuit training (large muscles before small muscles, alternate push and pull, alternate upper body and lower body), pyramid training and negative training. ○ Safety: clothing, footwear, equipment, spotters, technique. • Cardiorespiratory exercise <ul style="list-style-type: none"> ○ FITT principle; heart rate: VO2max; RPE ○ Recovery time between workouts should include sufficient rest, rehydration, and restoring fuel sources. 	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> ○ Long, slow-distance training: About 80% of maximum heart rate (70% VO₂max); the person is able to talk and exercise without respiratory distress. ○ Pace/tempo training: steady or threshold training for 20-30 minutes; intermittent pace/tempo training – intensity is same as steady threshold but shorter intervals of time with brief recovery periods. ○ Interval training: Intensity close to VO₂max; workout intervals between 3 and 5 minutes; rest intervals at equal/equivalent time; stressful and should be performed sparingly; benefits increased VO₂max and anaerobic metabolism <p>Personal fitness goals may be evaluated using a variety of measures. (9.3.d)</p> <ul style="list-style-type: none"> • Heart rate is most frequently used for gauging exercise intensity due to the relationship between heart rate and oxygen consumption (VO₂max is a measure of the body’s ability to extract and use oxygen during exercise). • Training zones may be characterized by the level of intensity (using a RPE scale) or percentage of maximal heart rate range. <ul style="list-style-type: none"> ○ Perceived exertion is how hard a person feels like their body is working. Rate of perceived exertion (RPE) is a way of measuring physical activity intensity level. Scales may range from five to 20 levels. Example (variation of Borg scale): <ul style="list-style-type: none"> ▪ Level 1 – Very light activity (seated) ▪ Level 2 – Light activity (can maintain for hours, easy to breathe, walking) ▪ Level 3 – Moderate activity (breathing heavily, somewhat 	

Essential Understandings	Essential Knowledge and Skills
<p>comfortable; skipping, galloping)</p> <ul style="list-style-type: none"> ▪ Level 4 – Vigorous activity (borderline uncomfortable, short of breath; jogging/running) ▪ Level 5 – Very hard activity (difficult to maintain exercise intensity, barely breathe, running/sprinting) ▪ Level 6 – Max effort activity (almost impossible to keep going, out of breath, sprinting) <ul style="list-style-type: none"> • Measures <ul style="list-style-type: none"> ○ Heart rate monitors (two types): wireless chest/arm straps that use an electrical pulse to read heart rate (tend to be more accurate) and wrist-based/headphones trackers that use optical technology (light). Both can send continuous data to a monitor (watch/phone). Other heart rate monitors and technology may be available. ○ Pedometers: tracks steps taken by indicating each time the wearer’s hips move; some models can track foot movement via a GPS tracker or built-in sensors on your phone. ○ Accelerometers: measure acceleration; able to capture intensity of physical activity; able to distinguish between walking and running; can separate human movement from mechanical vibration such as riding in a car (9.3.d). <p>Heart rate and blood pressure are indicators of cardiovascular fitness. (9.3.a, 9.3.d)</p> <ul style="list-style-type: none"> • Resting heart rate: Best taken after 10 minutes of rest. To check pulse at the wrist, place two fingers between the bone and the tendon over the radial artery, which is located on the thumb side of the wrist. When pulse is felt, count the number of beats in 15 seconds. Multiply this 	

Essential Understandings	Essential Knowledge and Skills
<p>number by four to calculate beats per minute. Resting heart rate normally ranges from 60-100 beats/min. In general, resting heart rate is an indication of efficient heart function and better cardiovascular fitness. A trained athlete may have a resting heart rate closer to 40.</p> <ul style="list-style-type: none"> • Target heart rates: active heart rate can be taken at multiple points during activity and include being taken immediately after stopping activity. Help to determine appropriate intensity levels for exercise. By keeping the target heart rate in check, a person is able to avoid under or over training and able to avoid overexertion. Exercise programs may be characterized by the level of intensity or percentage of maximal heart rate range (maximum heart rate is 220 minus a person’s age). (Target Heart Rate Zone information [https://www.heart.org/en/healthy-living/fitness/fitness-basics/target-heart-rates]) Some drugs and medications or medical conditions may affect heart rate, resulting in having a lower maximum heart rate and target zone. Health care provider should be consulted. • Recovery heart rate: Recovery heart rate is the decrease in heart rate that occurs one minute after maximal exercise. Faster decreases in heart rate are associated with higher levels of fitness. • Blood pressure: measure of the force of blood pushing against blood vessel walls; high blood pressure indicates that the heart is working harder to get blood out to the body; normal is less than 120/80; measured with a blood pressure cuff (sphygmomanometer) – a rubber cuff and a gauge. Works by inflating a cuff around the upper arm to temporarily stop the flow of blood in an artery. As air is slowly released from the cuff, the device records the pressure at which blood begins to flow again. Blood pressure is recorded as two measurements: 	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> ○ The first number is the systolic pressure. Systolic pressure represents the peak blood pressure that occurs when the heart contracts. ○ The second number is the diastolic pressure. Diastolic pressure represents the lowest blood pressure that occurs when the heart relaxes between beats. ○ Note: Teachers may want to connect with their school nurses, public health nurses or nurse training programs in their school or in their area to support instruction of blood pressure. <p>Appropriate techniques for resistance-training activities, machines, and/or free weights will be determined by activities selected. Focus should be on proper ergonomics/body positioning, equipment-related safety, and skill/capacity of individual students. Note; teachers may need to set appropriate weight limits. (9.3.e)</p> <p>It is important to use the scientific process to evaluate resources and technology in the fitness industry. (9.3.f)</p> <p>A variety of strength and stretching exercises can improve/maintain fitness levels. (9.3.g)</p> <ul style="list-style-type: none"> • Appropriate techniques for resistance-training activities are crucial to avoid injury and improve fitness levels. • Activities, whether using resistance bands, free weights, apps or media (videos) should match student interest, fitness level, activity level, and experience and should provide student choice; caution should be exercised when implementing any new techniques. 	

Essential Understandings	Essential Knowledge and Skills
<p>There is a wide range of terms and activities associated with fitness. (9.3.h) Examples include, but are not limited to:</p> <ul style="list-style-type: none"> • <i>Set</i>: a group of consecutive reps for any exercise. • <i>Repetition (rep)</i>: One completion of an activity or exercise • <i>Isometric</i>: muscle contraction in which the muscles length does not change • <i>Isotonic</i>: muscle contraction in which the muscles length does change • <i>Isokinetic</i>: muscular contraction in the absence of significant resistance, with marked shortening of muscle fibers and without great increase in muscle tone. • <i>Core</i>: refers to muscles that are the central part of the body; muscles of the upper and lower torso, around the spine and pelvic muscles (back, side, pelvic and buttock muscles); includes the rectus abdominis, transversus abdominis, obliques, trapezius, latissimus dorsi, spinal erector, gluteus maximus, pectoralis major and deltoid; provide stability, able to flex, side bend and rotate the trunk; protect abdominal organs. • Upper-body exercises train the following muscle groups to some degree – chest, back, shoulders, biceps, triceps. • Lower-body exercises train the following muscle groups to some degree – quadriceps, hamstrings, calves, lower back, abdominals. <p>Warming up and cooling down may help reduce risk of injury and improve athletic performance. (9.3.i)</p> <ul style="list-style-type: none"> • <i>Warm-up</i>: pumps nutrient-rich, oxygenated blood to muscles as it speeds up heart rate and breathing and raising body temperature, preparing the body for activity. A good warm-up should last five to 10 minutes and work all major muscle groups; start activity/exercise 	

Essential Understandings	Essential Knowledge and Skills
<p>slowly, then pick up the pace. Warming up may help reduce muscle soreness and risk of injury.</p> <ul style="list-style-type: none"> • Cool down: after a workout, five to 10 minutes cooling down through a sequence of slow movements; helps prevent muscle cramps and dizziness while gradually slowing breathing and heart rate; gradual recovery of pre-exercise heart rate and blood pressure. <p>Improvements in performance depend upon the training principles of specificity, overload, and progression (SOP). (9.3.i)</p> <ul style="list-style-type: none"> • Specificity: desired adaption occurs in response to specific stress placed upon the body; exercise/activity needs to match desired outcome • Overload: stress must be applied beyond that which the body is accustomed to; increase workload (added weight, time, intensity, and/or repetitions) • Progression: once the body has adapted to a level of stress, additional stress is needed; progressively or gradually increase workload 	

Social and Emotional Development

- 9.4 The student will explain and demonstrate the skills needed to be safe, responsible, and respectful in all physical activity settings.
- a) Identify and demonstrate proper etiquette, respect for the differences of others, integrity, safety and teamwork while engaging in a variety of activities.
 - b) Explain the effects of sports and activities in developing respect for the unique characteristics, differences and abilities of peers.
 - c) Apply conflict-resolution skills in physical activity settings.
 - d) Identify an opportunity for social support in a self-selected physical activity.
 - e) Apply communication skills and strategies that promote positive team/group dynamics.
 - f) Apply problem-solving and critical-thinking skills in physical activity settings, both as an individual and in groups.
 - g) Apply best practices for participating safely in physical activity, exercise, and dance (e.g., injury prevention, proper alignment, hydration, use of equipment, implementation of rules, sun protection).
 - h) Analyze and compare psychological benefits derived from various physical activities (e.g., decreased stress and anxiety, increased self-esteem, increased mental alertness, improved mood).
 - i) Develop and analyze activities to determine areas of exclusion and inclusion.

Essential Understandings	Essential Knowledge and Skills
<p>Social and emotional development and teamwork skills include respecting the rights and feeling of others while being sensitive and responsive to the well-being of everyone involved. (9.4.a)</p> <ul style="list-style-type: none"> • Leadership skills that contribute to teamwork include integrity, open and honest communication, active listening, empathy, trustworthiness, flexibility, relationship building, and respect for the differences and safety of others. • Etiquette is the proper and acceptable action, behavior, or conduct within an activity or setting. • Integrity is often linked to sportsmanship within physical education activities and involves doing the “right thing” even when no one else is 	<p>In order to meet these standards, it is expected that students will</p> <ul style="list-style-type: none"> • describe and demonstrate leadership skills that contribute to teamwork while participating in a variety of physical activities, exercise and dance (9.4.a); • create a list explaining proper etiquette for the PE setting (9.4.a); • explain how participation in sports, dance, and physical activities can build an individual’s character (9.4.b);

Essential Understandings	Essential Knowledge and Skills
<p>watching.</p> <ul style="list-style-type: none"> • Teamwork and leadership qualities are important outside the physical education classroom and often lead to opportunities to further demonstrate maturity and responsibility. <p>Accepting others’ ideas, cultural diversity, and body types is important to building a diverse community, team, or group. (9.4.b)</p> <ul style="list-style-type: none"> • Sharing ideas and respecting others leads to a more inclusive environment with positive group dynamics. • Modifying activities, rules, or equipment may be necessary to improve success rate and build skill for all individuals within a group or team. <p>Conflict is normal and inevitable, occurring in various settings throughout life experiences, and requires intentional positive resolution strategies. (9.4.c)</p> <ul style="list-style-type: none"> • Conflict resolution skills include: <ul style="list-style-type: none"> ○ Discuss problem without blame. ○ Active listening. ○ Identify and clarify issues and needs. ○ Brainstorm solutions and compromises. ○ Choose and apply a solution. ○ Evaluate the solution (9.4.c, 9.4.f). • Nonproductive/nonconstructive methods of handling conflict include criticism of others, blaming others, hurtful words, and/or hurtful actions. (9.4.c) <p>Physical activities, exercise and dance can provide social supports by meeting new people, engaging in similar interests with others, building collaboration</p>	<ul style="list-style-type: none"> • apply appropriate conflict-resolution skills in a variety of physical activity, exercise and dance settings (9.4.c); • demonstrate social support of classmates within the PE setting by regularly encouraging and motivating peers (9.4.d); • demonstrate leadership and communication skills/strategies during a variety of physical activity, exercise and dance (9.4.e); • apply problem-solving and critical-thinking skills to complete cooperative/team-building activities (9.4.f); • analyze an activity, exercise or dance and create rules to promote safety for all participants (9.4.g); • analyze and compare social, emotional, and mental benefits derived from physical activities, exercise, and dance (9.4.h); • modify the rules, equipment, or strategies/procedures of a selected activity, exercise, or dance in order to promote inclusion and positive group dynamics (9.4.i).

Essential Understandings	Essential Knowledge and Skills
<p>and cooperation, and improving community wellness. (9.4.d) Supporting others and being encouraged by others serves as a positive influence on self-efficacy and social/emotional wellness for both parties. (9.4.d)</p> <p>Communication skills/strategies are key to all social interactions, including physical activities, exercise, and dance. (9.4.e)</p> <ul style="list-style-type: none"> • Methods of communication include: <ul style="list-style-type: none"> ○ Verbal: sharing of information/relaying a message between two or more people that uses sounds, signs, and/or language; either oral or written; spoken word; either face-to-face or electronically. ○ Nonverbal: sending and receiving wordless messages; body movements/body language, such as facial expressions, body posture, gestures, eye contact, way, tone of voice, touch. ○ Visual: visual aids such as signs, graphics, drawings, design, color, graphs, charts. ○ Active listening: pay attention to the speaker; avoid being distracted; show you are listening, smile, nod; provide feedback – restate what you heard, ask questions; defer judgment – don’t interrupt; respond with respect. <p>Effective participation in physical activity, exercise, and dance requires critical thinking, both as an individual and within a group. (9.4.f)</p> <ul style="list-style-type: none"> • Critical-thinking skills allow someone to make logical and informed decisions to the best of their ability and is the intentional application of higher-order thinking. • Skills include observation, analysis, interpretation, inference, self- 	<p>Additional resources: OPEN Online Physical Education Network Health Smart Virginia PE Central EverFi KidsHealth.org</p>

Essential Understandings	Essential Knowledge and Skills
<p>regulation, open-mindedness, reflection, evaluation, explanation, decision making, and problem-solving.</p> <p>Knowledge and understanding of the environment, participant skill level/ability, and level of conditioning is key to planning a safe activity, exercise, or dance session. (9.4.g)</p> <ul style="list-style-type: none"> • Maintaining safe environments, adequate physical conditioning, proper body alignment/form, and following rules and procedures helps reduce injury during activity, exercise, and dance. • During very hot and humid weather, lessen the chances of dehydration and heat stress by <ul style="list-style-type: none"> ○ Exercising at a cooler time of the day. ○ Switching to indoor activities. ○ Changing the type or intensity of activity. ○ Providing adequate fluids, rest breaks, and shade as needed. • Use proper protection for sun exposure such as sunscreen, hat, clothing that protects from UV rays, and sunglasses. • Appropriate and properly fitted equipment for an activity may range from general items of clothing or footwear to special protective suits or apparatus, such as a mouth guard or shin guards. • Seek training and coaching for activities that involve advanced skills. <p>Physical activity and exercise can positively affect mental health, decrease stress, improve mood, and make individuals feel more connected to their community. (9.4.d, 9.4.h)</p> <p>Selection and participation in physical activities, exercise, and dance that one enjoys helps promote social, emotional, and mental wellness. (9.4.h)</p>	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> • Social and emotional benefits/supports of participation in physical activities may include: <ul style="list-style-type: none"> ○ Improved mental health and mood. ○ Reduced risk of depression and anxiety. ○ Development of higher self-esteem and body image. ○ Development of basic motor skills needed for day-to-day life. ○ Effective promotion of mutual understanding and empathy. ○ Growth of character and social skills like teamwork, cooperation and leadership. ○ Ability to handle winning and losing while being a good sport. ○ Development of resiliency. <p>A supportive, inclusive environment includes access to learning and the curriculum with the best approach to ensure learning physically, socially, and emotionally. This could include: speed of play, differentiated instruction, autonomy supported instruction, demonstrations, use of tools/modified equipment, peer/partner opportunities, etc. (9.4.i)</p> <ul style="list-style-type: none"> • Modifying activities, rules, or equipment may be necessary to improve the success rate and build skill for all individuals within a group or team. 	

Energy Balance

- 9.5 The student will explain the importance of energy balance and evaluate current caloric intake and caloric expenditure to maintain optimal health and prevent chronic disease.
- a) Explain the body’s physiological response to sugar, sodium, and fat.
 - b) Assess and analyze current energy balance, including intake and expenditure, activity levels, food choices, and amount of sleep.

- c) Explain body composition, using body mass index (BMI) and other measures, the variety of body types, and healthy body weight.
- d) Design and implement a plan to maintain an appropriate energy balance for a healthy, active lifestyle, including a balanced intake, expenditure (levels of intensity), and sleep.

Essential Understandings	Essential Knowledge and Skills
<p>The body needs sugar, sodium, and fat in appropriate quantities to function properly. (9.5.a)</p> <ul style="list-style-type: none"> • Sugar is a carbohydrate; the body processes table sugar (empty calories) and sugar in fruit (nutrients, fiber, lower calories) the same way. Sugar digestion begins in the mouth, but most occurs in the small intestine, where enzymes break sugar down to monosaccharides that are carried to the liver where it is converted to glucose. Glucose is used for energy or stored for later use. Glucose is an important and necessary fuel for the body; the liver and kidneys produce it naturally. The hormone insulin is released from cells located in the pancreas and regulates how much sugar circulates in the bloodstream. Insulin speeds up the transfer of sugar from blood and delivers it to muscle, liver, and fat tissues to be used as fuel or stored for the body to use later. If a person does not have enough insulin, sugar accumulates in the bloodstream and a person has diabetes. If not burned, excess sugar turns to fat, which is difficult to burn off because it takes a lot of energy. • Sodium, found in salt, is an electrolyte. Kidneys maintain the balance of electrolytes and water by regulating the fluids that are taken in and passed out of the body. If this balance is disturbed, muscles, nerves, and organs won't function correctly because the cells can't generate muscle contractions and nerve impulses. Too little salt results in hyponatremia, which can happen when a person sweats excessively. Too much sodium 	<p>In order to meet these standards, it is expected that students will</p> <ul style="list-style-type: none"> • explain the body's physiological response to sugar, sodium, and fat (9.5.a); • maintain a food log, exercise log, and sleep log in order to assess and analyze current energy balance, including sleep requirements (9.5.b); • explain body composition, measurement of body composition, body types, and healthy body weight (9.5.c); • differentiate between body composition and body weight, and explain the correlation between the two measurements (9.5.c); • design and implement a personalized nutrition, exercise, and sleep plan to maintain an appropriate energy balance and promote wellness (9.5.d). <p>Additional resources: SHAPE America National Standards and Grade-Level Outcomes</p>

Essential Understandings	Essential Knowledge and Skills
<p>results in hypernatremia; blood volume can increase, making the heart pump harder and is linked to high blood pressure. Dietary guidelines recommend less than 2,300 milligrams of sodium per day (less than half a teaspoon).</p> <ul style="list-style-type: none"> • Fat transfers vitamins A, D, E, and K in the blood that are needed for growth and healthy skin. Fat takes longer to digest than carbohydrates or proteins, which helps to satisfy hunger longer than other nutrients. Foods high in fat are usually high in calories; consuming excess amounts of fats increases the risk of unhealthful weight gain and obesity. Fats take more energy to burn. <p>The key to achieving and maintaining a healthy weight isn't about short-term dietary changes. It's about a lifestyle that includes healthy eating, regular physical activity, and balancing the calories you consume with the calories your body uses. (CDC) (9.5.b)</p> <ul style="list-style-type: none"> • Energy balance: includes food calories taken into the body through food and drink (energy in) and calories used for daily energy requirements (energy out). Daily energy requirements include the amount of energy required for body maintenance at rest, physical activity and movement, and for food digestion, absorption, and transport. • Physical activity guidelines: 60 minutes per day; weekly: 150 minutes of moderate-intensity aerobic activity, 75 minutes of vigorous-intensity aerobic activity, or an equivalent mix of the two each week. • Sleep: Teenagers should get eight to 10 hours of sleep each night. (CDC) (9.5.b) 	<p>OpenPhyzed Health Smart Virginia PE Central KidsHealth.gov MyPlate.gov Physical Activity Guidelines for Americans, 2nd ed. American Heart Association</p>

Essential Understandings	Essential Knowledge and Skills
<p>Body composition is the ratio of body fat to lean body tissue, including muscle, bone, water, and connective tissue. (9.5.c)</p> <ul style="list-style-type: none"> • There is not an ideal weight for everyone; weight ranges should take into account age, gender, height, body type, growth rate, metabolic rate, and activity level. • Body type is determined by heredity. <ul style="list-style-type: none"> ○ Mesomorph: characterized by low-to-medium percentage of body fat, medium-to-large bone size and a large amount of muscle mass and size; muscular and broader shoulders ○ Endomorph: characterized by high percentage of body fat, large bone size, and a small amount of muscle mass and size; rounder and broader hips ○ Ectomorph: characterized by low percentage of body fat, small bones size, and a small amount of muscle mass and size; slender and tall • Body-composition measures vary widely in methodology and accuracy. (9.5.c) <ul style="list-style-type: none"> ○ Body mass index (BMI) is based on height and weight; a high BMI can be an indicator of high body fat percentage; it can be used to screen for weight categories that may lead to health problems but it is not diagnostic of abnormal levels of body fats or health of an individual (CDC) (http://www.cdc.gov/healthyweight/assessing/bmi/index.html). ○ Skinfold calipers: measure the thickness of subcutaneous fat at three or seven different sites on the body. Accuracy is determined by hydration levels and the competence/experience of measurer. ○ Body circumference measurements: may include neck, waist, and 	

Essential Understandings	Essential Knowledge and Skills
<p>hips. Does not account for body type differences.</p> <ul style="list-style-type: none"> ○ Bioelectrical impedance analysis: a person places their hands on a device that runs a small current of electricity through the body for about 20 seconds to gauge body composition. Accuracy depends upon hydration levels and the sensitivity of the device. ○ Underwater weighing: the most accurate method for measuring body composition. Underwater weighing involves submerging a person in a tank of water and having them expel the air out of the lungs. This method is not easy to administer and can be very expensive. Error of underwater weighing is 2-2.5%. <p>Creation and implementation of an energy balance plan requires an understanding of one’s nutritional/energy needs, exercise/activity needs, and sleep requirements to ensure optimal health and wellness. (9.5.b, 9.5.d).</p>	