

GRADE TEN

Students in grade ten are proficient in fundamental movement skills and skill combinations and are competent in self-selected physical activities that they are likely to pursue throughout life including outdoor pursuits, fitness activities, dance and rhythmic activities, aquatics, selected individual performance activities, and net/wall and target games. They understand and apply concepts and principles of mechanics and anatomy in relation to human movement and apply the concepts and principles of the body’s metabolic response to short-term and long-term physical activity. Students are good leaders and good followers; they respect others and anticipate and avoid unsafe physical activity situations. They develop the ability to understand and they anticipate how physical activity interests and abilities change across a lifetime. Students demonstrate competency in lifelong physical activities and plan, implement, self-assess, and modify a personal fitness plan. Students are prepared to lead a physically active lifestyle.

Motor Skill Development

10.1 The student will demonstrate proficiency and apply the concepts and principles of exercise physiology, biomechanics, and anatomy in lifetime activities that may include outdoor pursuits, fitness activities, dance and rhythmic activities, aquatics, selected individual performance activities, and net/wall and target games in at least two self-selected, lifelong, skill-related physical activities.

- a) Demonstrate skill attainment in one or more lifetime activities.
- b) Apply and demonstrate knowledge of how movement is created, directed, and stabilized in one or more lifetime activities.
- c) Identify and demonstrate movement activities in each plane of motion (frontal, sagittal, and transverse) and activities that occur in multiple planes.
- d) Demonstrate appropriate and proper use of equipment in one or more lifetime activities.

Essential Understandings	Essential Knowledge and Skills
Skill attainment includes demonstration of all critical skill components and proficiency in application of skills and strategies specific to selected activities. Lifetime activities dependent upon activities offered to or selected by students. (10.1.a)	In order to meet these standards, it is expected that students will <ul style="list-style-type: none"> • demonstrate skill attainment in at least two lifetime activities (10.1.a); • apply and demonstrate knowledge of how

Essential Understandings	Essential Knowledge and Skills
<p>Note: Lifetime activities are dependent upon activities offered to or selected by students.</p> <ul style="list-style-type: none"> • Lifetime activities can be broken down in three categories: individual activities, dual activities, and team activities <ul style="list-style-type: none"> ○ Individual activities may include, but are not limited to: golf, yoga, cycling, hiking/backpacking, orienteering, rock climbing, rowing, canoeing or other paddle sports, swimming, jogging, walking, Pilates, dance, archery, weightlifting, tai chi, and skating. ○ Dual activities may include, but are not limited to: tennis, table tennis, badminton, pickleball, racquetball, squash, bocce ball, skating, tai chi, tennis, and bowling. ○ Team activities may include, but are not limited to: volleyball, basketball, softball, handball, ultimate frisbee, hockey, flag football. <p>Lifetime recreational pursuits can increase self-esteem, reduce substance abuse, build family bonds and promote volunteerism. (10.1.a)</p> <ul style="list-style-type: none"> • Benefits derived from outdoor pursuits: <ul style="list-style-type: none"> ○ Self-confidence: Students with limited physical skills can experience swift success in outdoor pursuits that leads them to believe in their ability to succeed. <ul style="list-style-type: none"> ▪ Example: Planning a travel route that is efficient and enjoyable for everyone. By understanding a map’s contours, students can not only avoid potential hazards (e.g., moving water, exposure to lightning) but conserve energy by avoiding unnecessary elevation gain or loss. By matching the difficulty of the route to the abilities of the group, the student supports the group while also experiencing a sense of accomplishment. Acquiring a new 	<ul style="list-style-type: none"> • movement is created, directed, and stabilized (10.1.b); • describe dynamic and unpredictable movement experiences (10.1.b); • define concentric, eccentric, and isometric movements and provide examples of each (10.1.b); • discuss how technological advances (such as “coaches’ eye,” or motion capture) can be used by students to apply and demonstrate/document how movement is created, directed, and stabilized in an activity (10.1.b); • identify and demonstrate movement activities in each plane of movement and activities that occur in multiple planes (10.1.c); • define planes of motion and provide examples of movement activities in each plane (10.1.c); • identify and demonstrate movements within specific sport that occur in singular and multiple planes (10.1.c); • demonstrate movement patterns of athletes in all three planes of motion during their sport (10.1.c); • plan for and practice multiple training

Essential Understandings	Essential Knowledge and Skills
<p>technical skill empowers and encourages continued involvement in an activity. Students are better poised to take on new challenges when they feel genuinely capable as a result of gaining new proficiencies.</p> <ul style="list-style-type: none"> ○ Mutual support: The emphasis on working together and respecting others necessitates a combination of interpersonal skills and appropriate communication. <ul style="list-style-type: none"> ▪ Example: Rock climbing involves cohesiveness and trust between climber and belayer. Good belayers provide climbers with the reassurance to push their physical limits by giving them the knowledge that they can do so without worry. Outdoor pursuits develop enthusiastic and contributing group members who view their roles as an important component of an effective team. ○ Fitness: There are different types of fitness in outdoor pursuits. <ul style="list-style-type: none"> ▪ Cycling up a steep incline provides the steady, sustained exercise recommended for cardiorespiratory endurance and weight control. ▪ Bouldering demands power, agility, and flexibility and involves certain skills that can compensate for insufficient power (e.g., relying more on the legs than the arms or using techniques for shifting weight and resting. ▪ Cycling can be adapted to individual fitness levels. ○ Excitement and fun: Whether perceived or real, an element of risk adds to the excitement of outdoor experiences. When students learn to cope successfully with risks, many of them become more autonomous and self-sufficient. (10.1.a) 	<p>exercises that occur in all three planes of motion to decrease potential injury (10.1.c);</p> <ul style="list-style-type: none"> • demonstrate appropriate and proper use of equipment (10.1.d); • identify safety equipment in activities and provide examples (10.1.d). <p>Additional resources: SHAPE America National Standards and Grade-Level Outcomes OpenPhyzed Health Smart Virginia PE Central Dynamic PE ASAP</p>

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> ▪ For example: caving often includes squeezing through cramped, shadowy passages that may be steep or slippery. This task can help students learn how to cope with fears and anxieties. If an activity isn't enjoyable, however, students will not willingly experience more of it. (10.1.a) ○ Wonder of nature: Although climbing high peaks presents important challenges, an equally valuable experience may be sitting still in a quiet place away from the usual distractions and listening to the breeze or observing a vast landscape or delicate flower. (10.1.a) <p>Movement is created by agility, power, coordination, reaction time, speed, force, motion, rotation and energy. (10.1.b)</p> <ul style="list-style-type: none"> • Movement is directed by 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), levers, force, rotation, motion, and energy. • Movement is stabilized by balance (center of gravity and center of support, muscle actions) and planes of motion (sagittal plane – flexion and extension; frontal plane – adduction and abduction; transverse plane – internal and external rotation; multi-plane movements). <p>All movement occurs within planes of motion (frontal, sagittal, and transverse). Some activities, such as running, occur in multiple planes. (10.1.c)</p> <ul style="list-style-type: none"> • The sagittal plane is a 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. Movements that involve forward and backward motion are sagittal plane movements. 	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> ○ Flexion and extension take place in the sagittal plane. ○ Rolling a bowling ball, sit-ups, and bicep curls are examples of exercises that occur in this plane. • The frontal plane is also vertical and passes from left to right, dividing the body into posterior and anterior halves. It is also known as the coronal or the mediolateral plane. <ul style="list-style-type: none"> ○ Abduction and adduction is often in the frontal plane. ○ Jumping jacks, spinal lateral flexion, and moving laterally through space are examples of exercises that occur in this plane. • The transverse/horizontal plane divides the body into top (superior) and bottom (inferior) halves. Any rotation in a joint, such as twisting movements, occur in this plane. <ul style="list-style-type: none"> ○ Rotation (internal, external, and twisting), pronation, and supination occur in the transverse plane. ○ Twisting lunges, side plank with rotation, and clamshells are examples of exercises that occur in this plane. • Running is an example of an activity that occurs in three planes. <ul style="list-style-type: none"> ○ Sagittal: Flexion occurs in the legs at the beginning of the swing phase of running, when the limb is moving forward. Extension occurs in the stance limb, reaching its full extension. ○ Frontal: Abduction and adduction are the movements. Observing the waistline, abduction is movement away from the middle line of the body, and adduction is movement toward-the middle line. Frontal plane movement is also seen in the rear foot when the shoe strikes the ground; this is termed ankle inversion and eversion. ○ Transverse: Rotation occurs in this plane between the pelvis, rib cage and shoulders. 	

Essential Understandings	Essential Knowledge and Skills
<p>Appropriate and proper use of equipment is dependent upon activities. (10.1.d)</p> <ul style="list-style-type: none"> • Equipment for an activity may range from general items of clothing to special protective suits or apparatus and items for safety. • It is essential to use the correct equipment and to make sure it is in good condition. • Identifying proper equipment for lifetime activities is necessary for safe participation. • Wearing a proper fitting helmet for different activities such as cycling, rock climbing, and canoeing is imperative. 	

Anatomical Basis of Movement

10.2 The student will apply knowledge of biomechanics and anatomy and analyze and evaluate the ability to move proficiently and efficiently in lifetime activities.

- a) Explain how the body responds to energy needs for anaerobic and aerobic activities, including fast and slow-twitch muscle fibers, and anaerobic respiration (ATP-PC and lactic acid system) and aerobic respiration.
- b) Analyze movement activities for component skills and movement patterns for one or more lifetime activities.
- c) Identify and explain the relationship of opposing muscle groups (agonist/antagonist).
- d) Explore common musculoskeletal injuries and the role of ergonomically correct movement for injury prevention.
- e) Explain and demonstrate ergonomically correct form in strength and conditioning activities.

Essential Understandings	Essential Knowledge and Skills
<p>The body responds to energy needs for anaerobic and aerobic activities, including fast- and slow-twitch muscle fibers, and anaerobic respiration (ATP-PC and lactic acid system) and aerobic respiration. (10.2.a)</p> <p>The body responds to anaerobic exercise in multiple phases: (10.2.a)</p> <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. • 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. • Anaerobic respiration transfers a relatively small amount of energy from glucose to cells. • 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 	<p>In order to meet these standards, it is expected that students will</p> <ul style="list-style-type: none"> • explain how the body responds to energy needs for anaerobic and aerobic activities, including fast- and slow-twitch muscle fibers, and anaerobic respiration (ATP-PC and lactic acid system) and aerobic respiration (10.2.a); • explain the difference between fast- and slow-twitch muscle fibers and provide examples (10.2.a); • discuss anaerobic and aerobic activities with examples (10.2.a); • explain the bodies response to anaerobic and aerobic exercise (10.2.a); • define and explain <i>aerobic respiration</i> and <i>anerobic respiration</i> (10.2.a);

Essential Understandings	Essential Knowledge and Skills
<p>production of lactic acid will reach the point where it interferes with muscular function; this is called the lactate threshold. (10.2.a)</p> <ul style="list-style-type: none"> • The process by which organisms break down glucose into a form that the cell can use as energy is cellular respiration. (10.2.a) • Muscles begin to fatigue when ATP resynthesizes and can no longer match demand. <p>The body responds to aerobic exercise differently than anaerobic exercise. (10.2.a)</p> <ul style="list-style-type: none"> • Due to the necessity of oxygen being present for aerobic metabolism, the first few minutes of low- to moderate-intensity exercise are powered by anaerobic metabolism. • Continued low- to moderate-intensity exercise is then fueled by carbohydrate and fat stores using aerobic metabolism. • Aerobic respiration uses oxygen to convert glucose into carbon dioxide and water, producing large amounts of ATP. • The intensity and duration of exercise determines which fuel source is used: <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. ○ Carbohydrates are a much faster fuel source and can be used for exercise up to 80% (in trained individuals). ○ Carbohydrate stores within the muscle and liver can fuel exercise for up to 80 minutes. As carbohydrate stores get lower, the body has to rely more and more on fat stores. • The intensity of exercise, which can be maintained, drops as fat cannot supply the amount of energy. 	<ul style="list-style-type: none"> • define <i>cellular respiration</i> (10.2.a); • explain the bodies choice in fuel sources (10.2.a); • explain the bodies choice in fuel sources during moderate activities, intense activities, shorter duration activities, longer duration activities (10.2.a); • analyze movement activities for component skills and movement patterns (10.2.b); • define the phases of movement (preparatory, execution, follow-through) (10.2.b); • demonstrate the phases of movement (preparatory, execution, follow-through) (10.2.b); • identify phases of movement in activity (10.2.b); • identify and explain the relationship of opposing muscle groups (10.2.c); • explain how agonist muscles bring about movement (10.2.c); • identify agonist muscles (10.2.c); • explain how antagonist muscles slow down or stop movement (10.2.c); • identify antagonist muscles (10.2.c); • explain the contraction and relaxation of muscles and identify antagonistic pairs

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> • Fast-twitch muscle fibers contract relatively rapidly, used especially in actions requiring maximum effort of short duration, such as sprinting. • Slow-twitch muscle fibers contract relatively slowly and are resistant to fatigue. <p>Movement can be analyzed by dividing the phases. (10.2.b)</p> <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. • Follow-through: Body movements after the execution where the movement slows down, such as the movement of the golf club after the ball is struck. • Movement skill phases may not all fit neatly into three phases and additional phases may be devised or added. Example: The long jump may also be divided into: preliminary movements; run-up; takeoff and landing. <p>Muscles work in antagonistic pairs called agonists and antagonists to create movement. (10.2.c)</p> <ul style="list-style-type: none"> • Agonist: (Prime movers) muscles that are associated with motion itself by shortening with a concentric contraction to produce a movement. Also referred to as prime movers, because they are the muscles that are primarily responsible for generating the movement. • Antagonistic: muscles that are associated with motion itself by 	<p>(bicep versus triceps) (10.2.c);</p> <ul style="list-style-type: none"> • explain how synergist muscles help create a range of movements (10.2.c); • explain the benefit of a resistance program that includes activities for opposing muscle groups (10.2.c); • explore the types of musculoskeletal disorders that occur in the workplace and the role of ergonomics (10.2.d); • identify musculoskeletal injuries and understand early identification of repetitive motion problems (10.2.d); • identify types of ergonomically correct movements for injury prevention (10.2.d); • explain the ergonomics of strength and conditioning activities (10.2.e). <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>

Essential Understandings	Essential Knowledge and Skills
<p>lengthening with an eccentric contraction to produce a movement.</p> <ul style="list-style-type: none"> • Example: Throwing—The triceps act as an agonist, extending the elbow to accelerate the ball. As the elbow approaches full extension, the biceps act as an antagonist to slow down elbow extension and bring it to a stop, thereby protecting elbow structures from internal impact. <p>Ergonomically correct movement helps prevent common musculoskeletal injuries. (10.2.d)</p> <ul style="list-style-type: none"> • The Department of Labor’s Bureau of Labor Statistics defines musculoskeletal disorders (MSDs) as musculoskeletal system and connective tissue diseases and disorders when the event or exposure leading to the case is bodily reaction (e.g., bending, climbing, crawling, reaching, twisting), overexertion, or repetitive motion. MSDs do not include disorders caused by slips, trips, falls, or similar incidents. Examples of MSDs include sprains, strains, and tears, back pain, carpal tunnel syndrome, and hernia. (CDC) • Ergonomics is the science of fitting workplace conditions and job demands to the capability of the working population. The goal of ergonomics is to reduce stress and eliminate injuries and disorders associated with the overuse of muscles, bad posture, and repeated tasks. A workplace ergonomics program can aim to prevent or control injuries and illnesses by eliminating or reducing worker exposure to risk factors. Risk factors include awkward postures, repetition, material handling, force, mechanical compression, vibration, temperature extremes, glare, inadequate lighting, and duration of exposure. For example, employees who spend many hours at a workstation may develop ergonomic-related problems resulting in musculoskeletal 	

Essential Understandings	Essential Knowledge and Skills
<p>disorders (MSDs).</p> <p>Ergonomically correct form can be applied to strength and conditioning activities to ensure correct body posture, ensuring that too much force or repetition/overuse is not occurring, and fitting the activity to the person. (10.2.e)</p>	

Fitness Planning

- 10.3 The student will demonstrate the ability to apply basic principles of training and scientific concepts and principles to evaluate current fitness behaviors and identify strategies needed for health-enhancing fitness for the present and into adulthood.
- a) Construct a fitness and activity plan for the present and the future (postsecondary education, college/career) to address the health-related components of fitness.
 - b) Identify the key factors an informed fitness consumer must evaluate to make critical and effective decisions when purchasing fitness products and/or services.
 - c) Identify fitness needs to prevent health concerns in the present and into the future.
 - d) Identify the effects of life choices, economics, motivation, accessibility, exercise adherence, and participation in physical activity in college or career settings.
 - e) Describe components of health-related fitness in relation to one career goal.
 - f) Explain the effects of physical activity on emotional and social well-being for the present and into the future.
 - g) Apply rate of perceived exertion (RPE) and pacing to a conditioning plan that meets the needs of one or more lifetime activities.
 - h) Design and implement a program for strength and conditioning.

Essential Understandings	Essential Knowledge and Skills
<p>Physical activity refers to the guideline of 60 minutes a day of moderate to vigorous physical activity. Health-related fitness is linked to fitness components that may lower risks, such as high blood pressure, diabetes, or low back pain. (10.3.a)</p> <ul style="list-style-type: none"> • Aerobic fitness: the ability of the heart and lungs to deliver blood to muscles. • Muscular strength and endurance: enough to do normal activities easily and protect the low back. • Flexibility: the ability to move joints through their proper range of motion. • Body composition: the ratio of body fat to lean body tissue, including muscle, bone, water and connective tissue. 	<p>In order to meet these standards, it is expected that students will</p> <ul style="list-style-type: none"> • create a fitness and activity plan for the present and the future to address the health-related components of fitness (10.3.a); • identify the components of fitness (10.3.a); • describe how the components of fitness relate to postsecondary work environment (10.3.a);

Essential Understandings	Essential Knowledge and Skills
<p>Addressing fitness components and planning for activity needs beyond high school should include how/where to access fitness and physical activities, the needs of the individual for the postsecondary environment. (i.e., college, career, and work-related needs, such as a job that requires standing or sitting most of the day or work requiring physical demands) (10.3.a,10.3.e)</p> <ul style="list-style-type: none"> • Aerobic fitness: the ability of the heart and lungs to deliver blood to muscles. • Muscular strength and endurance: critical to health and the ability to carry out daily activities, such as performing household tasks (yard work, carrying groceries) or job-related tasks (lifting or moving heavy objects). • Flexibility: for good joint function as well as being able to walk, lift, and step normally. The ability to move a joint through its normal range of motion is affected by the condition of the joint itself (for example: arthritis). A short (tight) muscle limits the joint’s ability to move normally. If the hamstrings are too short, they limit the ability of the pelvis to tilt, which directly affects the lower (lumbar) spine and can lead to low back pain. • Body composition: BMI measure is related to the risk of disease and death. The score is valid for men and women, but it does have some limitations. It may overestimate body fat in athletes and others who have a muscular build. It may underestimate body fat in older persons and others who have lost muscle mass. <p>A consumer is someone who purchases and uses economic goods. When a person purchases and uses products for physical fitness or physical activity, the person becomes a fitness consumer. (10.3.b)</p> <p>A fitness consumer should conduct research to understand the functions of the</p>	<ul style="list-style-type: none"> • identify the key factors an informed fitness consumer must evaluate to make critical and effective decisions when purchasing fitness products and/or services; • use a variety of resources to analyze current fitness and activity level (10.3.b); • identify fitness needs to prevent health concerns in the present and into the future (10.3.c); • identify the effects of life choices, economics, motivation, accessibility, exercise adherence, and participation in physical activity in college or career settings (10.3.d); • describe components of health-related fitness in relation to one career goal (10.3.e); • explain the effects of physical activity on emotional and social well-being for the present and into the future (10.3.f); • apply rate of perceived exertion (RPE) and pacing to a conditioning plan that meets the needs of one or more lifetime activities (10.3.g); • design and implement a program for

Essential Understandings	Essential Knowledge and Skills
<p>goods being purchased to improve or maintain their physical fitness levels. (10.3.b)</p> <p>A fitness consumer should consider the following before making purchases: (10.3.b)</p> <ul style="list-style-type: none"> • How will the goods being purchased affect the consumer’s fitness goals and needs? • How will the consumer use the equipment and how often? • Do the goods/equipment being purchased meet the consumer’s physical needs (for example, does the machine fit a consumer that is over 6 feet tall)? • Does the consumer have enough space for the goods being purchased to exercise safely? • Is the consumer getting the best price on the features they need? <p>Low-tech goods and technology-based devices and applications can be used to analyze, monitor, and improve fitness and activity levels without overpaying. (10.3.b)</p> <ul style="list-style-type: none"> • Pedometers: track 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 a phone. • Heart rate monitors: There are 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. • 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. 	<p>strength and conditioning (10.3.h).</p> <p>Additional resources: SHAPE America National Standards and Grade-Level Outcomes KidsHealth.gov Health Smart Virginia MyPlate.gov OpenPhyzed Physical Activity Guidelines for Americans, 2nd ed. Healthy Children.org</p>

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> • Variety of apps for watches and phones. • Calculator sites, such as: <ul style="list-style-type: none"> ○ BMI: https://www.cdc.gov/healthyweight/bmi/calculator.html ○ Calories burned: http://www.acefitness.org/acefit/healthy_living_tools_content.aspx?id=9 ○ One repetition maximum, or 1RM, in weight training: http://www.acefitness.org/acefit/healthy_living_tools_content.aspx?id=8 <p>Regular exercise helps control blood pressure, body weight, and cholesterol levels; decreases the risk for hardening of the arteries, heart attack, stroke, arthritis, and diabetes; improves digestion; helps to manage stress; aids in better sleep; and is good for managing low-back pain. Anyone can be at risk for chronic disease; however, some people are more at risk due to heredity (received from a parent or ancestor by genetic transmission) or because a condition is familial (tending to occur in more members of a family than expected by chance alone). (10.3.c)</p> <ul style="list-style-type: none"> • Risks with aging include falling, which can be reduced with balance and strength training. Balance training can include backward walking, sideways walking, heel walking, toe walking, practicing standing from a sitting position, and activities such as tai chi and yoga. Strong leg and hip muscles help to reduce the risk of falls, a cause of considerable disability among older adults. Resistance training at least two days per week, making sure to exercise all major muscle groups through a full range of motion and ending each workout with stretching exercises to help maintain mobility and range of motion, can decrease risk for injury. • Adults older than 50 who do not perform resistance training lose nearly one-quarter pound of muscle mass per year. Because muscle mass is directly related to how many calories your body burns each day, resistance training 	

Essential Understandings	Essential Knowledge and Skills
<p>is important for weight management.</p> <p>According to the CDC, physical activity is one of the best things people can do to improve their health. It is vital for healthy aging and can reduce the burden of chronic diseases and prevent early death. Active people generally live longer and are at less risk for serious health problems like heart disease, type 2 diabetes, obesity, and some cancers. For people with chronic diseases, physical activity can help manage these conditions and complications. Physical activity matters because (10.3.d):</p> <ul style="list-style-type: none"> • One in 2 adults live with a chronic disease. • Only half of adults get the physical activity they need to help reduce and prevent chronic diseases. • Getting enough physical activity could prevent 1 in 10 premature deaths. • Over \$1 billion annually in healthcare costs are associated with inadequate physical activity. • Physical activity has positive physical, emotional, social, and mental effects for children, adults, and healthy aging. • Work force effects: absenteeism and lost productivity from employee illness, injury, obesity or chronic conditions. One study reports that obesity alone has been estimated to cost employers almost \$2,500 per employee per year, including direct medical expenditures and absenteeism (Steps to Wellness– Physical Activity in the Workplace; CDC). • Building active, safe, and walkable communities help increase retail activity and employment, increase property values, reduce healthcare costs, improve safety, and positively influence the workforce (fewer sick days). <p>Physical activity that includes all health-related components of fitness are important</p>	

Essential Understandings	Essential Knowledge and Skills
<p>throughout life. Career choices may increase a need/focus on a particular area, such as a position that requires lifting heavy objects. In addition to aerobic fitness, muscular strength and endurance and flexibility have increased importance to ensure the strength to lift objects, maintain mobility and flexibility throughout repeated motions, ensure proper ergonomics (body positioning), protect the low back, and body composition/healthy weight to perform work activities. (10.3.e)</p> <p>Social and emotional benefits/supports of participation in physical activities may include but are not limited to: (10.3.f)</p> <ul style="list-style-type: none"> • Improves mental health and mood. • Reduces the risk of depression and anxiety. • Develops higher self-esteem and body image. • Helps develop basic motor skills needed for day-to-day life. • Effective in promoting mutual understanding and empathy. • Builds character: social skills like teamwork, cooperation, and leadership. • Ability to handle winning and losing while being a good sport. • Develops resiliency. <p>Pacing is needed to avoid fatigue before the end of an activity (e.g., jogging three miles). It is a strategy by which effort is managed during exercise based on a goal and the demands of the task; time per distance. Pacing strategies may include time, heart rate, and level of intensity/using an RPE scale. (10.2.g)</p> <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). 	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> ○ Level 2 – Light activity (can maintain for hours, easy to breathe; walking). ○ Level 3 – Moderate activity (breathing heavily, somewhat comfortable; skipping, galloping). ○ 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). <p>Design and implement a program for strength and conditioning. (10.2.h)</p> <ul style="list-style-type: none"> • Strength training is exercise that uses resistance (weights, bodyweight) to boost muscle mass, reduce fat percentage, strengthen bones and muscle. • Conditioning activities usually target the whole body to strengthen, shape, and tone; may include flexibility, strength and resistance training; conditioning activities may involve higher repetitions with primary goal of improving cardiovascular system. 	

Social and Emotional Development

10.4 The student will demonstrate appropriate behaviors in all physical activity settings and the social skills needed to be a contributing member of society.

- a) Explain the importance of and demonstrate effective communication skills in physical activity settings.
- b) Explain the importance of and apply relationship and conflict resolution skills and social awareness for current and future health and fitness.
- c) Identify and avoid prejudices and biases in physical activity settings.
- d) Explain the importance of understanding cultural diversity for personal health and fitness.
- e) Evaluate opportunities for social interaction and social support in a self-selected physical activity or dance.
- f) Apply stress-management strategies (e.g., mental imagery, relaxation techniques, deep breathing, aerobic exercise, meditation) to reduce stress.
- g) Explain the mental and emotional benefits of mind-body exercise/activities (e.g., yoga, Pilates, tai chi).
- h) Identify ways to promote equity and inclusion and embrace diversity in a physical activity setting.

Essential Understandings	Essential Knowledge and Skills
<p>Leadership and communication skills ensure inclusive and safe participation in physical activities. (10.4.a)</p> <ul style="list-style-type: none"> • Leadership skills include integrity, open and honest communication, active listening, empathy, trustworthiness, commitment, critical and creative thinking, flexibility, relationship building, dependability, time management, and ability to inspire and convince others. • Communication skills/strategies may 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. (10.4.a) ○ Nonverbal: sending and receiving wordless messages; body movements/body language, such as facial expressions, body posture, gestures, eye contact, way, tone of voice, and touch. 	<p>In order to meet these standards, it is expected that students will</p> <ul style="list-style-type: none"> • explain the importance of and demonstrate effective communication skills in physical activity settings (10.4.a); • explain the importance of and apply relationship and conflict resolution skills and social awareness for current and future health and fitness (10.4.b); • describe the role of critical thinking for current and future health and fitness (10.4.b);

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> ○ 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>Critical thinking and problem solving are essential for health and fitness, from setting goals and developing plans and strategies to accessing accurate and reliable information and evaluating resources for providers of health services and products. (10.4.b)</p> <p>Worksite audits may be beneficial to identify specific improvements that would improve the health and overall quality of the workspace. (10.4.b)</p> <p>Physical activity settings need to be evaluated for safety that includes effects on appropriate safety equipment, proper skills needed for the activity and environment, weather-related concerns, proper activity equipment, access to guides for outdoor pursuits, specialized trainers, and physical safety (e.g., use of sidewalks, traffic, bike lanes, free of debris and obstacles, lighting, and access to assistance if needed). (10.4.b)</p> <p>Prejudice is defined by the Merriam-Webster dictionary as, “injury or damage resulting from some judgment or action of another in disregard of one’s rights.” (Prejudice definition and meaning, Merriam-Webster) (10.4.c)</p> <p>Bias is defined as, “an inclination of temperament or outlook, <i>especially</i> a</p>	<ul style="list-style-type: none"> • identify and avoid prejudices and biases in physical activity setting (10.4.c); • explain the importance of understanding cultural diversity for personal health and fitness (10.4.d); • evaluate opportunities for social interaction and social support in a self-selected physical activity or dance (10.4.e); • explain how participation in physical activities develop social connections (10.4.e); • apply stress-management strategies (e.g., mental imagery, relaxation techniques, deep breathing, aerobic exercise, meditation) to reduce stress (10.4.f); • explain the mental and emotional benefits of mind-body exercise/activities (e.g., yoga, Pilates, tai chi) (10.4.g); • Identify ways to promote equity and inclusion and embrace diversity in a physical activity setting (10.4.h). <p>Additional resources: OPEN Online Physical Education Network Health Smart Virginia PE Central</p>

Essential Understandings	Essential Knowledge and Skills
<p>personal and sometimes unreasoned judgment.” (Bias definition and meaning, Merriam-Webster) (10.4.c)</p> <p>Prejudice and bias can occur in physical activity settings because people may have preconceived and false notions of what individuals or groups of people can and cannot do. Incidents of prejudice and bias in sport and physical activity can isolate members or groups within a community. Students should work to include all members of the community, regardless of race, sex, sexual orientation, weight, height, and/or disability, for example. (10.4.c)</p> <p>Students belong to various cultures, such as family, gender, teams, faith community, school, grade level, school classes, ethnicity, and interest groups/clubs. Understanding cultural diversity is important for all aspects of health, fitness, and life. (10.4.d)</p> <ul style="list-style-type: none"> • Culture: the beliefs, customs, and arts of a particular society, group, place, or time. • Cultural diversity: ethnic, gender, racial, and socioeconomic variety in a situation, institution, or group; the coexistence of different ethnic, gender, racial, and socioeconomic groups within one social unit (dictionary.com). • All of the significant differences between people, including perceptions of differences that need to be considered in particular situations and circumstances. Often the most significant differences are the least obvious, such as thinking styles or beliefs and values. <p>Physical activities, such as group exercise classes, recreation leagues, and jogging/biking offer an opportunity to socialize and develop friendships.</p>	<p>EverFi KidsHealth.org</p>

Essential Understandings	Essential Knowledge and Skills
<p>(10.4.e)</p> <ul style="list-style-type: none"> • Community resources for accessing physical activity or dance opportunities (parks and recreation facilities, faith community, recreation leagues, associations and organizations). • Identify current and future activities and how those activities may help students develop positive social relationships, now and into the future. <p>Stress-management strategies may include: (10.4.f)</p> <ul style="list-style-type: none"> • Relaxation techniques. • Breathing meditation: Deep breathing. • Progressive muscle relaxation: Systematically tense and relax different muscle groups in the body. • Body scan meditation: Focus on the sensations in each part of the body. • Mindfulness: Staying calm and focused in the present moment. • Visualization: Imagining a scene in which you feel at peace. • Rhythmic exercise (such as running, walking, rowing, or cycling): Engaging in the present moment, focusing your mind on how the body feels right now. • Social support and self-care (CDC) <ul style="list-style-type: none"> ○ Eat a healthy, well-balanced diet. ○ Exercise regularly. ○ Get plenty of sleep. ○ Give yourself a break if you feel stressed out (listen to music, take a walk). ○ Maintain a normal routine. ○ Stay active. You can take your mind off your problems by helping a neighbor, volunteering in the community, even taking the dog on a 	

Essential Understandings	Essential Knowledge and Skills
<p>long walk.</p> <p>Mind-body exercise/activities may include: (10.4.g)</p> <ul style="list-style-type: none"> • Yoga: a system of exercises; a series of moving and stationary poses and postures, combined with deep breathing, which help improve strength, flexibility and balance. • Pilates: a series of fluid movements performed in a precise manner, accompanied by specialized breathing techniques and intense mental concentration. • Tai chi: A Chinese form of exercise that uses very slow and controlled movements; it involves the practice of various postures; movements are continuous and serve to relax and align the body. <p>Creating an inclusive culture for physical education/school and physical activity in the community helps every student learn to lead a healthy and active lifestyle and have a sense of belonging, acceptance, and value (CDC). (10.4.h)</p> <ul style="list-style-type: none"> • Strategies for inclusion may include: <ul style="list-style-type: none"> ○ modifying/adapting the equipment, rules, environment, activity ○ creating a welcoming/inclusive environment, one that supports, uplifts, and promotes feelings of belonging, acceptance, and value ○ Understanding that diversity includes the effects of unequal power relations on the development of group identities and cultures ○ Respectfully expressing curiosity about the history and lived experiences of others and the exchange ideas and beliefs in an open-minded way ○ Interacting comfortably and respectfully with all people, whether 	

Essential Understandings	Essential Knowledge and Skills
<p>they are similar to or different from oneself.</p> <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 but are not limited to: (10.4.h)</p> <ul style="list-style-type: none"> • speed of play • differentiated instruction • autonomy supported instruction • demonstrations, use of tools/modified equipment • peer/partner opportunities 	

Energy Balance

- 10.5 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 for the present and into adulthood.
- a) Analyze the relationships among physical activity, nutrition, body composition, and sleep that are optimal for personal health and/or for participation in lifetime activities.
 - b) Evaluate current activity and intensity levels.
 - c) Evaluate current caloric expenditure and intake needs.
 - d) Evaluate current sleep needs.
 - e) Evaluate the caloric intake needs for before, during, and after lifetime activities.
 - f) Explain energy balance (caloric expenditure vs. caloric intake) in relation to changing needs from adolescence through adulthood.
 - g) Explain the potential consequences of energy imbalance (e.g., over-exercising, under eating, over-eating, sedentary lifestyle).
 - h) Explain the role of perseverance and tenacity in achieving lifelong energy balance.

Essential Understandings	Essential Knowledge and Skills
<p>Each person may have different needs for calories and exercise. A healthy lifestyle requires balancing foods you eat, beverages you drink, adequate sleep, stress management, and the amount of activity in your daily routine (CDC). (10.5.a)</p> <ul style="list-style-type: none"> • Regular exercise helps control blood pressure, body weight, and cholesterol levels; decreases the risk for hardening of the arteries, heart attack, stroke, arthritis, and diabetes; improves digestion, helps to manage stress, aids in better sleep and is good for managing low-back pain. • A healthy eating plan emphasizes fruits, vegetables, whole grains, and fat-free or low-fat milk and milk products; includes lean meats, poultry, fish, beans, eggs, and nuts; is low in saturated fats, trans fats, cholesterol, salt (sodium), and added sugars; and stays within daily 	<p>In order to meet these standards, it is expected that students will</p> <ul style="list-style-type: none"> • analyze the relationships among physical activity, nutrition, body composition, and sleep that are optimal for personal health and/or for participation in lifetime activities (10.5.a); • evaluate current activity and intensity levels (10.5.b); • evaluate current caloric expenditure and intake needs (10.5.c); • evaluate current sleep needs (10.5.d); • evaluate the caloric intake needs for

Essential Understandings	Essential Knowledge and Skills
<p>calorie needs.</p> <ul style="list-style-type: none"> • Body composition: A high amount of body fat can lead to weight-related diseases and other health issues. Being underweight is also a health risk. • Sleep is a powerful regulator of appetite, energy use, and weight control. Sleep deprivation can inhibit one’s ability to lose weight even while exercising and eating well. <p>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. (10.5.b)</p> <ul style="list-style-type: none"> • Use the rate of perceived exertion (RPE) scale and determine workout intensity. • Perceived exertion is how hard a person feels like their body is working. RPE is a way of measuring physical activity intensity level. Scales may range from five to 20 levels. <ul style="list-style-type: none"> ○ 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 comfortable; skipping, galloping) ▪ 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, 	<p>before, during, and after lifetime activities. (10.5.e);</p> <ul style="list-style-type: none"> • explain energy balance (caloric expenditure versus caloric intake) in relation to changing needs from adolescence through adulthood (10.5.f); • explain the potential consequences of energy imbalance (e.g., over-exercising, under eating, over-eating, sedentary lifestyle) (10.5.g); • explain the role of perseverance and tenacity in achieving lifelong energy balance (10.5.h). <p>Additional resources: SHAPE America National Standards and Grade-Level Outcomes 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>out of breath, sprinting) Expenditure and intake needs vary with age and physical activity levels. (10.5.c)</p> <p>Refer to Dietary Guidelines for Americans (https://www.dietaryguidelines.gov/) for adolescent and adult guidelines for caloric expenditure and intake. Also see the DRI Calculator for Healthcare Professionals tool that calculates daily nutrient recommendations based on the Dietary Reference Intakes (DRIs) established by the Health and Medicine Division of the National Academies of Sciences, Engineering, and Medicine. The data represents the most current scientific knowledge on nutrient needs; however, individual requirements may be higher or lower than DRI recommendations. (https://www.nal.usda.gov/fnic/dri-calculator/index.php) (10.5.c)</p> <p>Guidelines for sleep: teens 13-18 should get eight-10 hours per 24 hours of sleep; adults 18-60 should get seven or more hours per night (CDC). (10.5.d)</p> <ul style="list-style-type: none"> • Stimulants like coffee and energy drinks, alarm clocks, and external lights (including those from electronic devices) interfere with our “circadian rhythm,” or natural sleep/wake cycle. • A good night’s sleep improves learning. Sleep is involved in the healing and repair of heart and blood vessels. The right amount of sleep reduces heart rate and blood pressure. Getting enough sleep helps a person function productively/safely throughout the day. People who are sleep deficient are less productive at work/school. They take longer to finish tasks, have a slower reaction time and make more mistakes. Consult a primary care physician or a sleep professional to determine the 	

Essential Understandings	Essential Knowledge and Skills
<p>underlying cause, if experiencing symptoms such as: sleepiness during the day or when you expect to be awake and alert, snoring, leg cramps or tingling, gasping or difficulty breathing during sleep, prolonged insomnia or another symptom that is preventing you from sleeping well.</p> <p>Evaluate the caloric intake needs for before, during, and after lifetime activities. (10.5.e)</p> <ul style="list-style-type: none"> • Pre-lifetime physical activity: <ul style="list-style-type: none"> ○ Good supply of protein for tissue repair one to two hours before activity. A lifetime activity that has a lot of cardio requires more carbohydrates than protein. Carbohydrates are metabolized into glucose (energy) very quickly, so they should be consumed 30-60 minutes before an activity. • During physical lifetime activity: <ul style="list-style-type: none"> ○ Add protein and fiber to deliver a steadier supply of energy throughout the activity. • After a lifetime physical activity: <ul style="list-style-type: none"> ○ Go for carbohydrates to replace the energy in depleted muscles. Protein, though, is almost equally important in sealing in your physical activity benefits and promoting recovery. <p>Explain energy balance (caloric expenditure versus caloric intake) in relation to changing needs from adolescence through adulthood. (10.5.f)</p> <p>Refer to Dietary Guidelines for Americans (10.5.f) (https://www.dietaryguidelines.gov/) for adolescent and adult guidelines for caloric expenditure and intake. Also see the DRI Calculator for Healthcare</p>	

Essential Understandings	Essential Knowledge and Skills
<p>Professionals tool that calculates daily nutrient recommendations based on the Dietary Reference Intakes (DRIs) established by the Health and Medicine Division of the National Academies of Sciences, Engineering, and Medicine. The data represents the most current scientific knowledge on nutrient needs; however, individual requirements may be higher or lower than DRI recommendations. (https://www.nal.usda.gov/fnic/dri-calculator/index.php) (10.5.f)</p> <p>Energy imbalance may include (10.5.g)</p> <ul style="list-style-type: none"> • Taking in more calories than expending results in a caloric surplus; this can result in muscle gain, fat gain, or both. • When calories taken in equals calories expended, the result is maintenance; everything stays the same • Expending more calories than calories taken in results in a caloric deficit (negative energy balance); this can result in fat loss, muscle loss, or both. <ul style="list-style-type: none"> ○ The effects of a negative energy balance (more out than in) include: Decline in metabolism, decreases in bone mass, reductions in thyroid hormones, reductions in testosterone levels, inability to concentrate and a reduction in physical performance. ○ Excessive amounts of physical activity can lead to injuries, menstrual abnormalities, and bone weakening. ○ Signs of over-exercise may include delayed recovery time, depression, insomnia, disinterest in exercise, mood changes, fatigue. <p>Explain the role of perseverance and tenacity in achieving lifelong energy balance. (10.5.h)</p>	

Essential Understandings	Essential Knowledge and Skills
<p>People’s needs, interests, and circumstances change over a lifetime. Achieving a lifestyle that includes healthy eating, regular physical activity, and balancing calories consumed with calories the body uses takes an ongoing commitment, perseverance and tenacity. (10.5.h)</p> <ul style="list-style-type: none"> • Perseverance is the “continued effort to do or achieve something despite difficulties, failure, or opposition.” (https://www.merriam-webster.com/dictionary/perseverance) • Tenacity is the state or quality of being tenacious: “persistent in maintaining, adhering to, or seeking something valued or desired.” (https://www.merriam-webster.com/dictionary/tenacious) 	