

**Strength Training for**  
**Young Athletes**

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# LEARNING OBJECTIVES

After reading Strength Training for Young Athletes, the participant will be able to:

1. Understand an in-depth and educational review of safe and effective exercises for performance.
2. Identify the biomechanics and proper lifting techniques to increase muscular strength in young athletes.
3. Recognize how to prevent injuries in sport and recreational activities.
4. Understand common injuries and special considerations of resistance training for young athletes.
5. Identify numerous ways to increase muscular endurance and power for sport specific training.
6. Recognize corrective training techniques, flexibility and strength exercises for optimal results.
7. Know how to design resistance-training routines for various sports in and off-season programs.
8. Easily understand and identify all of the muscles functions during exercise.
9. Understand about neuromuscular maturity, bone development, and reproductive maturity for the young athlete.
10. Learn how social and personal benefits help improve body image and self-confidence.
11. Identify the best options, and consider the factors to ensure a safe training environment for all participants.
12. Recognize how to create a well-designed training program using multi and single joint exercises.

13. Understand the physical and psychological developmental stages for young athletes.
14. Identify the differences and advantages of exercise duration, and the number of training days per week to ensure training success.
15. Recognize the best types of core, replacement, injury prevention and advanced exercises needed for sport specific training programs.
16. Know how to design a periodization training model for a prepubescent child and athlete.
17. Recognize how variations such as resistance, repetitions, and sets vary accordingly based on the programming and age of young athletes.
18. Understand several professional associations and societies guidelines for strength training with children.
19. Understand functional anatomy and muscle biomechanics to safely design resistance-training programs for young athletes and children.
20. Know the safety, efficacy and positioning of power exercises and resistance training exercises for children.



**CEC/CEU Test for Strength Training For Young Athletes**

**Please choose the BEST answer for each question.**

- 1. Strength training can best be described as the ability to produce maximal \_\_\_\_\_.  
a. Flexion  
b. Metabolism  
c. Force  
d. Synthesis**
  
- 2. A properly designed resistance-training program can \_\_\_\_\_.  
a. Help children prepare for athletic competition  
b. Provide health benefits  
c. Help prevent injury  
d. All of the above**
  
- 3. In studies, children as young as \_\_\_\_\_ have benefited from some resistance-training programs.  
a. 5 years old  
b. 6 years old  
c. 7 years old  
d. 8 years old**
  
- 4. A short-term resistance-training program for children of about 8-20 weeks, can often result in strength gains of \_\_\_\_\_ to \_\_\_\_\_ percent.  
a. 10 - 20  
b. 20 - 30  
c. 30 - 50  
d. 60 - 80**

**5. Initial strength changes usually result from low volume training. Low volume can be best described as \_\_\_\_.**

- a. Sets times reps times load
- b. Performing the same exercises
- c. All multi-joint exercise
- d. Simple range of motion

**6. A variety of progressive-resistance programs seem to work very well for untrained children over \_\_\_\_ periods of time.**

- a. Long
- b. Short
- c. Various
- d. Interval

**7. Approximately \_\_\_\_ percent of boys and \_\_\_\_ percent of girls in America play organized sports.**

- a. 20 - 20
- b. 40 - 20
- c. 75 - 50
- d. 50 - 25

**8. A well-designed resistance program can help children develop \_\_\_\_.**

- a. Concentration to detail
- b. Poise under fatigue
- c. Positive characteristics
- d. All of the above

**9. Becoming muscle bound as a result of resistance training is \_\_\_\_.**

- a. Probable
- b. Not possible
- c. Absolutely true
- d. A myth

**10. The key component to hooking a child on a weight training or resistance program is \_\_\_\_.**

- a. Pure luck
- b. Parental genetics
- c. Seeing progress
- d. Performing the same exercises

**11. Resistance training for young athletes or children, is a process designed to meet the ever-changing training \_\_\_\_\_ of a child.**

- a. Needs
- b. Wants
- c. Desires
- d. Goals

**12. According to the NEISS report, the most common training injuries in young athletes are \_\_\_\_\_.**

- a. Ankles
- b. Joints and tendons
- c. Sprains and strains
- d. Muscle tears

**13. Generally, the risk of injury associated with resistance programs is \_\_\_\_\_ for children than adults.**

- a. Greater
- b. Less
- c. Similar
- d. Incidental

**14. An area of concern for children who weight train is the potential damage to \_\_\_\_\_.**

- a. A single joint
- b. Growth plates
- c. Nerve compression
- d. Overuse syndrome

**15. Another concern about resistance training in children is the potential for \_\_\_\_\_.**

- a. Soft tissue injuries
- b. Damage to the epiphyses
- c. Fracture of the lumbosacral
- d. All of the above

**16. A study of adolescent power lifters using near maximal resistance, revealed that 50 percent of the injuries were to the \_\_\_\_\_.**

- a. Upper extremities
- b. Low back
- c. Knees
- d. Lower extremities

**17. \_\_\_\_\_ is described as how fast a force can be applied over a range of motion.**

- a. Strength
- b. Power
- c. One RM
- d. Plyometrics

**18. The NSCA position continues to recommend that prepubescent children should weight train with weights they can lift at least \_\_\_\_\_ repetitions.**

- a. Six
- b. Eight
- c. Ten
- d. Twelve

**19. Which lift is NOT a competition power lift?**

- a. The squat
- b. The dead lift
- c. The bench press
- d. The overhead press

**20. A good strength-training program does NOT rely on \_\_\_\_\_.**

- a. Comprehension
- b. Militaristic discipline
- c. Preparation
- d. Core assessment

**21. Which segment of the body is the first to adapt to exercise stimuli?**

- a. Dendrites
- b. Joints
- c. Connective tissue
- d. The central nervous system



**22. Hypertrophy is another word for \_\_\_\_.**

- a. Increase in muscle size
- b. Increase in muscle cell size
- c. Neither
- d. Both

**23. A well-trained nervous system is highly capable of better stimulation of \_\_\_\_ to produce force.**

- a. PNF
- b. Muscles
- c. Static resistance
- d. Neuromuscular facilitation

**24. Prepubescent children usually lack growth factors and \_\_\_\_ to help stimulate hypertrophy.**

- a. Androgens
- b. Proteins
- c. Amino acids
- d. Anti-oxidants

**25. Testosterone is \_\_\_\_ to \_\_\_\_ times lower in concentration in girls compared to boys.**

- a. 50 - 100
- b. 10 - 20
- c. 10 - 30
- d. 25 - 50

**26. The word anabolic can be best described as \_\_\_\_.**

- a. To build
- b. To reproduce
- c. A precursor
- d. A stimulant

**27. All of the major organizations that support resistance training for children promote the following concepts EXCEPT \_\_\_\_.**

- a. Training should be individualized
- b. Warm up and cool down periods should be used
- c. Proper spotting techniques should be used
- d. It should impose hard work

**28. Physical and psychological differences in children is a result from what biologists refer to as \_\_\_\_\_.**

- a. Active release technique
- b. Nurture or nature
- c. Mass to power ratio
- d. None of the above

**29. \_\_\_\_\_ is a motor learning term for the number of trials performed in learning a skill.**

- a. Motor patterns
- b. Electronic muscle stimulation
- c. Mass practice
- d. System characteristics

**30. Another word for genetic potential is \_\_\_\_\_.**

- a. Neuromuscular maturity
- b. Phenotypic expression
- c. Genotype
- d. Beta

**31. From the onset of birth, all children grow at different rates. Growth occurs in what is called a \_\_\_\_\_.**

- a. Pulsatile
- b. Magnum
- c. Midas
- d. Oasis

**32. Which one is a modifying factor that can affect bone development and maturation?**

- a. Exercise
- b. Disease
- c. Menarche
- d. All of the above

**33. The greatest bone mineral content peaks occur in boys from ages \_\_\_\_\_ to \_\_\_\_\_.**

- a. 11 - 13
- b. 12 - 14
- c. 13 - 15
- d. 14 - 16

- 34. Peak muscle mass in women occurs between the ages of \_\_\_\_ .**
- a. 18 - 25
  - b. 16 - 23
  - c. 20 - 27
  - d. 25 - 30
- 35. The number of muscles cells is \_\_\_\_ in girls when compared to boys.**
- a. The same
  - b. Less than
  - c. Greater than
  - d. A one to two ratio
- 36. Adolescent boys who have been training for at least \_\_\_\_, were able to increase their blood testosterone levels following a resistance-training program.**
- a. Six months
  - b. One year
  - c. 18 months
  - d. Two years
- 37. Degeneration of the bone where the patella tendon attaches to the tibia is known as \_\_\_\_.**
- a. Worn cartilage
  - b. A medial meniscus tear
  - c. Osgood-Schlatter disease
  - d. Joint disease
- 38. Which is NOT one of the three major muscle actions?**
- a. Isometric
  - b. Dynamic concentric
  - c. Eccentric dynamic
  - d. Dynamic eccentric
- 39. During a \_\_\_\_ action, the muscle contracts but no movement takes place.**
- a. Dynamic
  - b. Isometric
  - c. Eccentric
  - d. Eccentric dynamic

**40. What type of action takes places when the muscle contracts and shortens, and movement occurs?**

- a. Dynamic concentric
- b. Eccentric contraction
- c. Dynamic eccentric
- d. Internal rotation

**41. What type of action takes place during a lift when the muscle is active and lengthens?**

- a. External rotation
- b. Internal rotation
- c. Dynamic eccentric
- d. None of the above

**42. What type of training involves the lowering of a weight with the load greater than can be lifted concentrically?**

- a. Eccentric only
- b. Dynamic only
- c. Static only
- d. Eccentric dynamic only

**43. Research has demonstrated that using both \_\_\_\_\_ and \_\_\_\_\_ motions in repetitions will help achieve better strength gains.**

- a. Concentric / eccentric
- b. Dynamic / static
- c. Static / eccentric dynamic
- d. Dynamic eccentric / dynamic

**44. The breakdown of stored carbohydrates (glycogen) without the use of oxygen produces \_\_\_\_\_.**

- a. Adenosine tri-phosphate
- b. Creatine phosphate
- c. Lactic acid
- d. Adenosine-di-phosphate

**45. If the energy source being used is aerobic, then the muscular contraction is \_\_\_\_\_ and the duration of the activity is \_\_\_\_\_.**

- a. Maximal - very short
- b. Near maximal – moderate
- c. Sub maximal - long
- d. Sub maximal - near maximal

**46. Growth cartilage at the apophyseal insertions ensures a solid connection between the \_\_\_\_\_ and \_\_\_\_\_.**

- a. Tendon – bone
- b. Bicep- Scapula
- c. Trapezius - deltoid
- d. None of the above

**47. According to data from the President’s Council on Physical Fitness and Sports, \_\_\_\_\_ percentage of girls between 6 to 17 years old cannot perform one pull-up.**

- a. Twenty
- b. Forty
- c. Sixty
- d. Eighty

**48. \_\_\_\_\_ is known as a popular way of varying the training volume and intensity of an adult’s workout.**

- a. Plyometrics
- b. Periodization
- c. Speed training
- d. Active rest

**49. When designing a strength-training model for a prepubescent child, they should use \_\_\_\_\_ and \_\_\_\_\_ repetitions.**

- a. 3 sets and 10 to 15
- b. 3 sets and 6 to 10
- c. 2-3 sets and 6 to 8
- d. 1-2 sets and 6 to 8

**50. If the training session is designed to maintain gains in strength and power, then rest periods should be \_\_\_\_.**

- a. Less than 30 seconds
- b. Less than one minute
- c. At least two minutes
- d. 90 to 120 seconds

**51. Medicine ball training provides a type of \_\_\_\_ training.**

- a. Plyometric
- b. Isometric
- c. Static resistance
- d. Interval

**52. Schedule issues may affect the frequency of training, however training fewer than \_\_\_\_ days a week may not be optimal.**

- a. Three
- b. Four
- c. Five
- d. None of the above

**53. Common motor performance tests for children are \_\_\_\_ and \_\_\_\_.**

- a. Bench press – squats
- b. Sprints – jumps
- c. Push ups – sit-ups
- d. Core assessments - lateral movements

**54. When setting up the resistance training facility, how many feet should separate each piece of equipment.**

- a. Four
- b. Six
- c. Eight
- d. Ten

**55. Increased blood lactate levels are due to a \_\_\_\_.**

- a. Increase in proteins
- b. Increase in carbohydrates
- c. Increase in amino acids
- d. By-product of lactic acid

**56. Which one is NOT a factor involving proper exercise technique.**

- a. Giving lifters feedback
- b. Use of collars
- c. Spotting technique
- d. Athleticism

**57. A weak lower back may result in \_\_\_\_\_ when performing a squat.**

- a. Improper foot stance
- b. Planter-flexion
- c. Rounding of the back
- d. Excess stress on the tibia

**58. The major goal of the spotting is \_\_\_\_\_.**

- a. Encourage the lifter in performance
- b. Prevent injury
- c. Determine technique
- d. Count repetitions

**59. Dynamic lifts such as power cleans are generally not spotted because they are performed at \_\_\_\_\_.**

- a. Low velocity
- b. Medium velocity
- c. High velocity
- d. No velocity with intervals

**60. Which one is NOT one of the major types of grip used with a barbell?**

- a. Mixed
- b. Cross
- c. Underhand
- d. Overhand

**61. When performing a T-bar row exercise, the machines center of rotation is located \_\_\_\_\_ the feet of the lifter.**

- a. Near
- b. Well behind
- c. Well in front of External rotation of the humerus
- d. 45 degrees to

**62. An example of a unilateral exercise is \_\_\_\_\_.**

- a. Single leg knee curls
- b. Single leg knee extensions
- c. Most dumbbell exercises
- d. All of the above

**63. A single joint exercise requires the action of \_\_\_\_\_ muscle group(s) as a prime mover.**

- a. Two
- b. Three
- c. One
- d. Zero

**64. Multi joint exercises are often used to train the muscles of the \_\_\_\_\_.**

- a. Upper back
- b. Forearms
- c. Biceps
- d. Calves

**65. Leaning back to start the exercise is often a common technique error for which exercise?**

- a. Bent-over dumbbell laterals
- b. Superman exercise on a Swiss ball
- c. Lat pull-down
- d. Front lateral raise

**66. Which is an example of a multi-joint upper body exercise?**

- a. Barbell bench press
- b. Machine overhead press
- c. Seated machine row
- d. All of the above

**67. The most effective exercise for the latissimus dorsi is \_\_\_\_\_.**

- a. The bar not raised all the way up
- b. Pulling the bar down behind the head
- c. Alternating pulling the bar behind the head and to the chest
- d. Pulling the bar down to the top of the chest



**68. When performing a seated cable row, the lifter sits on the seat with the torso forming a \_\_\_\_\_ degree angle with the thighs.**

- a. 90
- b. 50
- c. 45
- d. 100

**69. When performing a barbell bent over row, the lifter bends forward from the waist so the torso is at a \_\_\_\_\_ degree angle to the floor.**

- a. 90
- b. 45
- c. 0
- d. 100

**70. A common technique error when performing a pull-up is \_\_\_\_\_.**

- a. Failing to extend the elbow at the end of repetition
- b. Raising the legs to start the pulling motion
- c. Failure to get the chin above the bar
- d. All of the above

**71. Which muscle is NOT trained when performing a machine bench press?**

- a. Pectoralis minor
- b. Anterior deltoid
- c. Triceps
- d. Bicep femoris

**72. If a lifter feels shoulder pain during a machine decline press at the chest touch position, they should \_\_\_\_\_.**

- a. Keep the upper arms closer to the torso
- b. Keep the upper arms farther away from the torso
- c. Use a mixed grip to neutralize the movement
- d. Adduct the radial head of the deltoid to a different position

**73. When performing a barbell incline press, the proper hand positioning should be \_\_\_\_\_.**

- a. Shoulder width
- b. Slightly wider than shoulder width
- c. Slightly less than shoulder width
- d. In centerline with the sternum

**74. When performing a barbell overhead press, the elbows are \_\_\_\_\_ the barbell.**

- a. In front of
- b. Directly below
- c. Both A and B
- d. None of the above

**75. When performing a barbell overhead press, the knees \_\_\_\_\_.**

- a. Form a right angle to the lifter
- b. Are at 90 degrees
- c. Are hyper-extended
- d. Are slightly bent

**76. What type of grip should be used if the lifter feels shoulder pain while doing a machine overhead press?**

- a. Palms facing each other
- b. Palms facing the lifter
- c. Back of the hand facing the lifter
- d. A mixed grip

**77. When designing a routine for adolescent children, what machine is excellent for increasing strength of the lower back and hips?**

- a. Seated leg extension
- b. Hyperextension
- c. Lat pulldown
- d. Decline press

**78. The hands are approximately \_\_\_\_\_ apart while doing a barbell upright row.**

- a. 4 inches
- b. 6 inches
- c. 8 inches
- d. 12 inches

**79. Which of the following is considered a variation of a squat?**

- a. The body weight squat
- b. The free weight squat
- c. The resistive ball squat
- d. All of the above

**80. Which of the following is NOT a multi-joint lower body exercise?**

- a. Dumbbell lunge
- b. Hip sled
- c. Leg extension
- d. Dumbbell squat

**81. The rotator cuff is a group of muscles that rotate and stabilize the upper arm or \_\_\_\_\_ in the shoulder joint.**

- a. Posterior deltoid
- b. Humerus
- c. Anterior deltoid
- d. Radial tuberosity

**82. Which one is NOT a muscle trained in rotator cuff exercises?**

- a. Teres minor
- b. Infraspinatus
- c. Front deltoid
- d. Subscapularis

**83. Using the hands to push the pads on a peck dec instead of the elbows, allows more use of the \_\_\_\_\_.**

- a. Posterior deltoid
- b. Anterior deltoid
- c. Minor rhomboids
- d. Major rhomboids

**84. The straight bar emphasizes the \_\_\_\_\_ when performing a two arm triceps push down.**

- a. Long head
- b. Short head
- c. Lateral and long head
- d. Short and long head

**85. When performing a dumbbell triceps kickback, the proper starting position is \_\_\_\_\_.**

- a. The opposite hand and knee are on the bench
- b. The same hand and knee are on the bench
- c. No knee is on the bench
- d. None of the above

**86. Which upper back muscles are trained in the bench dip?**

- a. Rhomboids
- b. Latissimus dorsi
- c. Both A and B
- d. Neither A nor B

**87. When performing a shoulder internal rotation exercise, the elbow of the arm with which the dumbbell is held is at a \_\_\_\_\_ degree angle.**

- a. 180
- b. 120
- c. 60
- d. 90

**88. The seated calf raise exercise puts the most amount of emphasis on the \_\_\_\_\_.**

- a. Achille's tendon
- b. Soleus
- c. Gastrocnemius
- d. Posterior tibialis

**89. During a seated leg extension, the lifter's toes should be \_\_\_\_\_.**

- a. Relaxed
- b. Dorsiflexed
- c. Planterflexed
- d. Ridged

**90. The torso should hang down and form a \_\_\_\_\_ degree angle with the legs on a back extension machine exercise.**

- a. 15
- b. 45
- c. 60
- d. 90

**91. When a child performs an advanced exercise such as a power clean, the amount of resistance used should always allow \_\_\_\_\_ or more repetitions.**

- a. 6
- b. 8
- c. 10
- d. 12

**92. When performing a dead lift or a power clean, make sure the bar \_\_\_\_\_ the body at all times.**

- a. Is far away from
- b. Is a few inches from
- c. Touches
- d. None of the above

**93. When designing an off-season program for alpine skiing, always use \_\_\_\_\_ for the single joint exercises.**

- a. More repetitions
- b. 8 to 10 RM
- c. Lower weights
- d. All of the above

**94. When designing an off-season program for baseball, the lifter should rest for \_\_\_\_\_ between sets for large muscle groups, and for \_\_\_\_\_ for small muscle groups.**

- a. One minute – Two minutes
- b. Two minutes – one minute
- c. Two minutes - 90 seconds
- d. 90 seconds – 60 seconds

**95. When designing an in season program for baseball, abdominal exercises should consist of \_\_\_\_\_.**

- a. 20 – 30 repetitions
- b. 30 – 50 repetitions
- c. Zero abdominals in season
- d. None of the above

**96. When creating a routine and modifying all the exercises for children, ideally its best to increase stress on \_\_\_\_.**

- a. Attachments
- b. Ligaments
- c. Muscles
- d. Tendons

**97. Blood lactate is a by-product of \_\_\_\_.**

- a. Aerobic threshold
- b. An-aerobic metabolism
- c. Protein synthesis
- d. Creatine

**98. When designing a pre season program for football, the lifter should rest for \_\_\_\_ between sets.**

- a. One to 1.5 minutes
- b. Two minutes
- c. Two to three minutes
- d. 30 seconds

**99. Which of the following is NOT a core exercise for a golf program?**

- a. Bench presses
- b. Squats
- c. Lateral raises
- d. Lunges

**100. To help develop and increase intensity to a well-designed program for swimmers, the rest period between sets should be \_\_\_\_.**

- a. Less than one minute
- b. Less than 30 seconds
- c. Only supersets
- d. Only in intervals