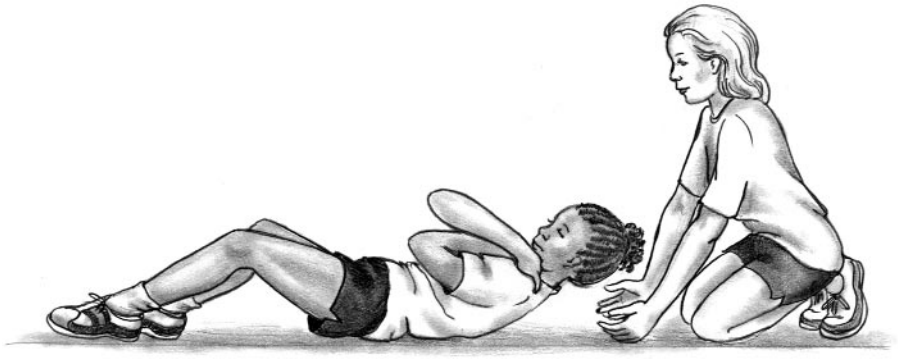
Fitness Performance Assessment

A Classroom-Based Assessment
for Washington Students

High School



A Component of the
Washington State Assessment Program

ACKNOWLEDGMENTS

Body Composition Conversion Charts for Girls and Boys from *Fitnessgram: Test Administration Manual*. Reprinted with permission of The Cooper Institute, Dallas, TX. FITNESSGRAM® is a registered trademark of The Cooper Institute for Aerobic Research.

CDC Growth Charts; United States Boys and Girls 2 to 20 years. Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion; <http://www.cdc.gov/nccdphp/dnpa/mor-info.htm>; (accessed: 22 July 2002).

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A Model for Conducting Fitness Performance Assessments

Introduction

Fitness assessments encompass a variety of measures designed to provide individualized feedback regarding one's overall fitness status and/or physiological responses to physical effort. Fitness assessments can and should be developmentally appropriate.

Fitness assessments may include "traditional" assessments such as those of VO_2 max with the one-mile walking test, or more simplistic assessments of basic physiological responses such as heart rate during moderate physical activity. The purpose of fitness assessments is not solely to rate an individual's fitness. In fact, an education assessment might provide physiological feedback regarding a process that can then be used to explain and illustrate fundamental fitness principles. A simple measure of resting heart rate, followed by a determination of heart rate during exercise, followed by an assessment of recovery heart rate can constitute a broad interpretation of what fitness assessments represent in an educational setting. Such an assessment:

- provides physiological feedback for the student, and
- can be used to illustrate important concepts regarding how heart rate responses vary dependent upon cardiovascular fitness level.

Although fitness assessments provide some "concrete" information, they are not without flaws and concerns. Fitness assessments should not be used without careful consideration of the benefits and ramifications they might bring to a learning environment. The following is a short list of what fitness assessments can do and a list of what they cannot do.

Fitness assessments should be used in the curriculum to:

- provide an opportunity to teach and reinforce essential concepts related to the benefits and importance of choosing to live a healthy lifestyle now and in the future
- provide an opportunity to teach students how to self-assess their own health-related fitness throughout their lives
- provide students with confidential baseline information from which accurate and reasonable short-term and long-term fitness and activity goals can be established
- provide a forum for teaching students the theory, rationale, accuracy and appropriate use of fitness assessments throughout their lives, and

- provide an opportunity to critically reflect on how individual differences, including genetic and maturity levels and/or goal setting and personal programming accuracies or errors, might have impacted perceived or expected fitness progress.

Fitness assessments should not be used in the curriculum to:

- evaluate the effectiveness of a curriculum in physical education, health, or fitness
- evaluate the effectiveness of teaching
- determine to any degree student grades in physical education, health, or fitness
- make blind assumptions regarding student physical activity levels
- prove student health status, or
- provide a basis for punishment or rewards.

Specific Issues and Special Concerns in Conducting Fitness Assessments of Children and Youth

Developmental and Physiological Considerations—A Brief Synopsis

Issues in Cardiorespiratory Functioning

Aerobic function expressed as a relative measure of oxygen consumption (VO_2 peak in ml/kg/min) is similar between children, adolescents, and adults. However, the biomechanical efficiency of movement is considerably compromised in younger children and pre-adolescents. This biomechanical disadvantage makes locomotor skills utilized in most fitness assessments of VO_2 peak more costly in children compared to adults. As such, VO_2 peak represents the physiological functioning of the cardiorespiratory system in children and youth but fails to be a strong reflection of cardiorespiratory endurance. In other words, children and youth might be unduly fatigued due to biomechanical disadvantages in movement patterns. As children grow, the movement patterns become more efficient and allow for an "artificial" improvement of VO_2 peak to be achieved (or for VO_2 peak to remain unchanged despite actual reductions in the physiological capacity of the aerobic system). The implication of this is that the tracking of VO_2 measures over time is likely to be positively influenced by naturally occurring improvements in biomechanical movement patterns.

Maximum heart rate is higher in children and adolescents than in adults. Children and adolescents have lower stroke volume, which is partially compensated for by an increase in heart rate. However, total cardiac output remains lower than that of adults until the late teenage years. The implication of this is that predictions of maximum heart rate (such as 220 – age) are less useful for children or early adolescents. This is a critical issue as most field tests of cardiorespiratory endurance use an estimate of maximum heart rate as a fundamental point to which submaximal responses are extrapolated (such extrapolations are the basis for most prediction equations).

Because changes pertaining to the cardiorespiratory system will be dependent upon maturational timing (rather than chronological age), attempting to adjust for changes based solely on chronological age becomes problematic. Early- or late-maturing adolescents will be adversely affected by such adjustments.

Finally, to further complicate the above issues, differences exist between boys and girls with regard to the pattern of change seen over time. For boys, relative measures of VO_2 peak remain largely unchanged between the ages of 8 and 16 before beginning a gradual decline into adulthood. However, girls show a rather constant decline in relative measures of VO_2 peak beginning sometime between the ages of 10 and 12. These changes are due in part to maturational factors including, but not limited to, changes in body composition. The implication of this is that the tracking of relative fitness measures over time might inadvertently benefit boys over girls, even when activity levels between both groups are similar.

Issues in Muscular Fitness

Muscle fiber number and type is fixed within the first year of life. As a result, there is a large genetic and uncontrolled factor governing musculoskeletal performance of humans. However, most health-related thresholds are reasonable and can be accomplished by the vast majority of individuals with training. Nerve development, motor unit activation, muscle fiber size, and testosterone are all lower in the child/prepubertal adolescent than in adults. As a result, they exhibit less strength, power, and muscular endurance per unit of weight than adults. Due to musculoskeletal immaturity, maximum strength testing should be avoided in children and young adolescents.

There are minimal differences in strength measures between boys and girls before puberty. However, during and after puberty, boys increase muscle mass and girls increase fat mass under the influence of testosterone and estrogen, respectively.[1] The gap in maximal strength measures widens between the sexes as maturity progresses, becoming more evident in upper body versus lower body locations.

The practical implication of these differences suggests that muscular strength and endurance assessments will naturally improve for boys, even without physical activity or effort, and will naturally tend to decrease in girls, even with regular physical activity. As such, assessments of these components must account for these changes.

Poor flexibility is typically not an issue for children and adolescents. However, despite popular conceptions, children are not always more flexible than adults, and girls are not always more flexible than boys. Some patterns that have been established with regard to particular muscle groups/joints include:

- Anterior lumbar flexibility decreases during adolescence in both boys and girls, but regains earlier levels of flexibility during adulthood.
- Lateral spinal flexibility increases during adolescence and then declines throughout adulthood.
- Hamstring flexibility (as measured by the Sit-and-Reach) improves consistently in girls ages 5–18, but exhibits a "U-shaped progression" in boys, and the values for girls are generally higher than for boys.

During periods of rapid growth, the musculoskeletal structures become tighter across joints, potentially temporarily impacting performance (and increasing injury risk) on flexibility measures. The practical implications suggest that flexibility as tested by common measures may be somewhat subject to individual differences in maturation and growth rates.

Issues in Body Composition

Body composition is a complex and controversial topic, even without adding in the considerable developmental issues.

Body composition testing in schools should take the following into consideration:

1. There are significant methodological concerns with body composition testing in general, and the most commonly used techniques in schools are fraught with the most potential for error.
2. Interpretation of results is not clear-cut or agreed upon, especially when dealing with the results of children and adolescents.
3. Fatness as an independent risk factor for disease is not without considerable legitimate argument (such as the well-established overriding effects of regular physical activity in attenuating disease risk).
4. Results of tests, accurate or not, can inadvertently reinforce cultural prejudices and may serve to further accentuate obsessions with thinness, feelings of fatness, and related negative health behaviors.

When body composition is conducted in schools, **comprehensive** and **accurate** education about body composition (including genetic influences/individual differences, fat distribution patterning issues, assessment limitations, how to interpret results responsibly and in a greater context of health/fitness, how physical activity and exercise can help to maintain the best body composition for each individual but not the same composition for all individuals, etc.) should be provided and *supplemented* with optional body composition testing. If testing is done, testing procedures and results should be kept confidential.

Common Questions and Answers Regarding Fitness Assessments

What are criterion-referenced standards?

Criterion-referenced standards are predetermined standards of performance tied to specified domains of behavior. Health-related criterion-referenced standards attempt to establish the minimal threshold of a fitness measure that is necessary for the attenuation of disease risk. Criterion-referenced standards are different from norm-referenced standards. Norm-referenced standards compare student performance on a test to the scores of other students having common characteristics. Such standards offer no comparison to any meaningful health criterion, and often serve to dissuade or discourage children who rank in the lower percentages.

Despite the advantages of using criterion-referenced standards (primarily including the potential for all to succeed and the apparent connection to meaningful health information), it must be noted that most criterion-referenced standards set for children and youth are based on normative scores, empirical evidence, and judgment, not on scientific studies.[2,3] This is understandable, given that children and youth do not generally suffer from chronic illness or die from lifestyle-related diseases. Thus, it is impossible to truly establish threshold levels that are scientifically meaningful. Nonetheless, criterion-referenced standards are deemed more appropriate for use in the interpretation of fitness assessments than are norm-referenced standards.

How do fitness assessments, if they aren't good, correlate to health or activity in youth?

Fitness assessments are valuable learning tools and can be used to personalize and reinforce important concepts. They also allow for meaningful and relevant fitness and activity goals to be set that follow the principles of overload and progression. As long as students understand their inherent limitations and use them in the context of comprehensive fitness education, fitness assessments are meaningful and valuable.

Should I grade students based on their scores?

Since fitness assessments are greatly influenced by maturational timing, genetics, gender, body type, body size, and body mechanics, and are less influenced by time or effort spent in physical activity, it is inappropriate to tie fitness assessment scores to student grades.

Is it okay to grade students based on their improvement from the beginning of the semester to the end?

Due to maturation, most students will post improvements in fitness assessments without any effort up through puberty. Following puberty, it is unlikely that time spent in physical education will result in significant gains in fitness for all students. Furthermore, students who are engaged in extracurricular activities will have an advantage over students who are not engaged in extracurricular activities.

Although some might view this as acceptable (or even desirable), it creates unethical and unintentional discrimination against those students who are unable to be active outside of school due to socioeconomical, cultural, or other barriers beyond their personal control. Furthermore, error in the accuracy of prediction equations (the basis for most assessments) can hide or exaggerate true change in unpredictable ways. Finally, students may try to "beat the system" by intentionally performing below their ability on the pretest, in order to assure improvement on the posttest.[4] Therefore, it is probably not wise to use improvement scores as a required component of a student's grade.

How do I make time to do all of these fitness assessments?

Testing students in a "pull out" is time-consuming and compromises overall supervision of activities. Having students self-assess or peer-assess fitness can be a viable and defensible way to save time and achieve learning objectives. Conducting mass testing, establishing a testing circuit, or using partners for testing are recognized strategies. However, if peer assessments are used, it is critical that students be permitted to self-select their partners. Potential inaccuracies from the lack of testing experience must be clearly acknowledged when peer- or self-assessment strategies are employed.

Won't allowing students to self-assess their fitness create even more error?

Yes. Again, what is the purpose of the testing and what is the philosophy and goal of the educational program? Rarely is "accurately assessing the fitness levels of students" a high priority objective within a quality educational program.

Why isn't student improvement a reflection of the curriculum or my teaching?

Student improvement in fitness measures is more closely related to maturational timing, genetics, gender, body type, body size, and body mechanics than to effort or time spent in physical activity. Regardless, excellent teaching implies that learning has occurred. Measures of physical fitness have no established correlation to knowledge or understanding of fitness concepts. On the other hand, assessments that demonstrate a student's ability to apply fitness concepts and principles to real-life situations can be used to evaluate program effectiveness.

Introductory comments prepared by Karen E. McConnell, Ph.D, CHES, and reviewed by Pam Tollefsen, R.N., M.Ed, Office of Superintendent of Public Instruction.

Cited References:

1. Plowman, S. S. "Children Aren't Miniature Adults: Similarities and Differences in Physiological Responses to Exercise." *ACSM's Health and Fitness Journal* 5 (2001): 5–6.

2. Corbin, C. B. "Physical Activity for Everyone: What Every Educator Should Know About Promoting Lifelong Physical Activity." *JTPE* 21, no. 2 (January 2002).

3. Corbin, C. B. "Physical Fitness in the K–12 Curriculum: Some Defensible Solutions to Perennial Problems." *JOPERD* 58, no. 7 (1987): 49–57.

4. Strand, B. N., Scantling, E., and Johnson, M. *Fitness Education: Teaching Concepts Based Fitness in the Schools.* Scottsdale, Arizona: Gorsuch Scarisbrick Publishers, 1997.

Additional References:

Allsbrook, L. "Fitness Should Fit Children." *JOPERD*, (August 1992): 47–49.

Bouchard, C. "Heredity and Health-related Fitness." *Physical Activity and Fitness Research Digest* 1, no. 4 (1987): 1–8.

Bouchard, C., Shephard, R.J. and Stephens, T., eds. *Physical Activity, Fitness and Health: International Proceedings and Consensus Statement.* Champaign, Illinois: Human Kinetics, 1994.

Brynteson, P., and Adams, T. M. "The Effects of Conceptually Based Physical Education Programs on Attitudes and Exercise Habits of College Alumni After 2 to 11 Years of Follow-up." *Research Quarterly for Exercise and Sport.* 64, no. 2 (1993): 208–212.

Cureton, K. J. and Warren, G. L. "Criterion-referenced Standards for Youth Health-related Fitness Tests: A Tutorial." *Research Quarterly for Exercise and Sport* 61, no. 1 (1990): 7–19.

Pangrazi, R. P., and Corbin, C. B. "Physical Activity for Children and Youth." *JOPERD* 67, no. 4 (1996): 38–43.

Pangrazi, R. P. and Corbin, C. B. "Physical Fitness: Questions Teachers Ask." *JOPERD* 64, no. 7 (1993): 14–19.

Pangrazi, R. P., Corbin, C. B., and Welk, G. "Physical Activity for Children and Youth." *JOPERD* 67, no. 4 (April 1996).

Park, R. J. "Measurement of Physical Fitness: A Historical Perspective." *ODPHP Monograph Series* (1991): 1–37.

Slava, S., et al. "Long Term Effects of a Conceptual Physical Education Program." *Research Quarterly for Exercise and Sport* 55, no. 2 (1984): 161–168.

Assessment Administration Considerations

This model fitness assessment is provided to assist schools not currently using one of the most commonly available fitness assessments (such as the *Fitnessgram* and the *President's Challenge*) to provide items that can be used in conjunction with instruction for students in grades 5, 8, and high school. It is not intended to replace fitness assessments already in use. It is hoped that a fitness assessment will be used to assist students in learning how they can self-assess and monitor their own fitness levels throughout their lives, analyze their results, set goals, and create a plan to maintain or improve their measurements.

A suggested student record form and a fitness planning log/journal are provided to assist in connecting the performance of fitness assessments to understanding how they apply to the health and fitness essential academic learning requirements.

More than one option of measurement is provided for each component of fitness. For some options, additional instructions are provided to assist in preparing to conduct a fitness assessment for your students.

Cardiorespiratory—options

One-Mile Run—Grades 5, 8, and High School

Students who have not experienced running this distance should be provided an opportunity at least several days prior to the assessment date to run/walk this distance. This will allow them to experience the length of the course and to realize how pacing will help them to do their best.

The Pacer—Grade 5

Teachers may obtain a copy of a tape or CD for this assessment from the Cooper Institute for Aerobic Research or from Human Kinetics.

Step Test—Grade 8 and High School

This assessment requires students to step to a 4-beat cadence. This can be provided through a tape or CD created by the teacher or by use of a metronome. The pace calls for 96 beats per minute for a stepping rate of 24 completed steps per minute. The YMCA protocol provides for a 12-inch bench height. A prerecorded tape is available from *Fitnessgram*, Human Kinetics.

Time in the Target Heart Rate (THR) Zone—Grade 10 and High School

Walk Test—Grade 10 and High School

Muscular Fitness—options

Flexed-Arm Hang—Grades 5, 8, and High School

Pull-Ups—Grades 5, 8, and High School

Modified Pull-Ups—Grades 5, 8, and High School

Push-Ups—Grades 5, 8, and High School

Note: An additional option to this assessment would be a modified push-up in which the student leaves both the feet and knees on the floor.

Curl-Ups—Grades 5, 8, and High School

Flexibility—options

Sit-and-Reach—Grades 5, 8, and High School

This option requires a modified box approximately twelve inches high with a yardstick secured on the top. The yardstick extends over the top of the box with the nine-inch mark at the edge of the box nearest the student.

Trunk Lift (Prone Arm Lift)—Grades 5, 8, and High School

V Sit-and-Reach—Grades 5, 8, and High School

Body Composition—options

The concept of body composition is important for students to understand. Body composition is complex in its implications to many students. In terms of its relationship to overall fitness, levels of physical activity may be a better measure than body composition. Actual assessment of this component of fitness is provided as an option at the high-school level. Only one of the options included in this model, the skin caliper measurement, actually provides a measure for percentage of lean body mass or percentage of body fat. The body mass index measures the ratio of body weight to body height. It cannot actually determine the percentage of body fat and lean body mass.

Many schools use a variety of other resources to measure body fat percentages. Reliability for most of them is subject to variables including hydration, time of day, and medications a student may be taking.

Body composition measurements should be offered only as an *option* for students and in a private setting. Prior to conducting body composition measurements, students should receive instruction about the positive and negative elements of body fat, the importance of balance in eating patterns, and physical activity and the normal genetic variations in body structure, as well as differences between males and females.

Skin Caliper—High School

Body Mass Index—High School

Norms and Standards—options

Norms and standards are available from several sources for each of the assessments provided. Those most commonly used in schools include:

The President's Challenge Physical Fitness Program
400 East 7th Street, Bloomington, IN 47405-3085
www.indiana.edu/~preschal

FITNESSGRAM, Human Kinetics
P.O. Box 5076, Champaign, IL 61825-5076
www.americanfitness.net

Norms and standards are included in the Appendix.

STUDENT FITNESS ASSESSMENT RECORD

Student Name _____

Fitness Component	Name of Test	Practice Score(s)	Best Score	Date

STUDENT FITNESS ASSESSMENT RECORD

Student Name _____

Fitness Component	Name of Test	Practice Score(s)	Best Score	Date

Fitness Planning Log

High School: _____

Name: _____ Date: _____

Fitness Component	Name of Test	Results	Previous Score	Comments

Write a goal to improve or maintain your level of fitness for each component of fitness.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Write a plan to achieve your goals.

Describe how this plan might need to change or how it will be affected in 5 years, in 10 years, and in 30 years. Include how changes in your life will present barriers and opportunities to achieve your goals.

Identify physical activity opportunities at home and in your community that will assist you in maintaining your level of fitness.

Assessment Activity: One-Mile Run
Fitness Category: Cardiorespiratory Endurance

Testing Procedure:

The teacher will select a one-mile flat course, free of obstacles or safety concerns.

The teacher will use a stopwatch to measure the time it takes a student to complete a one-mile run.

The student will:

- warm up
- start to run on the teacher's call
- pace him- or herself by finding a comfortable pace that is maintainable for the entire mile
- be permitted to walk if he or she can no longer run; however, when walking the student should try to walk at a fast pace instead of strolling.

The teacher will inform the student of his or her time as he or she crosses the finish line.

The student will record his or her time on the individual record form. Norms can be used to help students assess their measurements. Norms and standards have been included in the Appendix.

Performance Norms:

Fitness Program:

	Age 15	**Age 16**	**Age 17**
BOYS	7:00–9:00 minutes	7:00–8:30 minutes	7:00–8:30 minutes
GIRLS	8:00–10:30 minutes	8:00–10:00 minutes	8:00–10:00 minutes

Presidential Physical Fitness Award:

	Age 15	**Age 16**	**Age 17**
BOYS	6:20 minutes	6:08 minutes	6:06 minutes
GIRLS	8:08 minutes	8:23 minutes	8:15 minutes

Activities to Improve Results: Your fitness program should include activities that use the cardiorespiratory system for 20 or more minutes, three to four times per week. Recommended heart rate levels during the activities should be between 60% and 80% of your maximum heart rate for improvement to occur.

An aerobic warm up should be included in all daily activities. Perform activities including, but not limited to, the following: running, walking, swimming, cross-country skiing, and sports. Aerobic dance activities are highly recommended. Include circuit training as a regular part of your program to promote improvement.

Assessment Activity: Step Test
Fitness Category: Cardiorespiratory Endurance

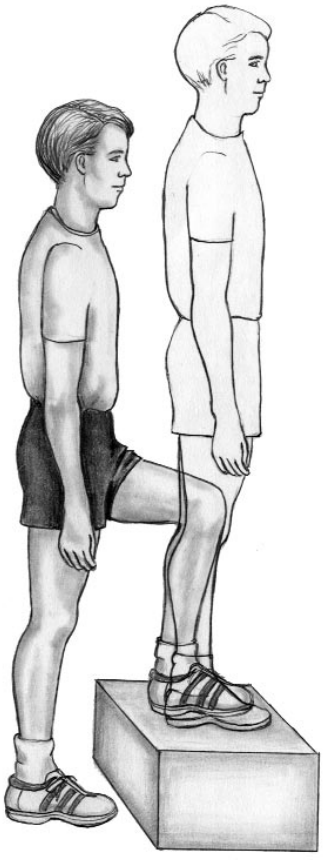
Testing Procedure:

The teacher will select a step height that is age appropriate. A 12-inch step is recommended. The teacher should check to make sure it does not place an excessive strain on the knee. Before the students begin the assessment, the teacher should demonstrate alternating stepping cadence or set metronome.

The student will:

- begin the test when the CD, tape, or video starts
- begin a 4-beat cadence on the signal, starting with the right foot (up right, up left, down right, down left)
- continue the test for 3 minutes
- stop at the end of the 3-minute exercise and immediately (within 5 seconds) sit down and begin taking their pulse for 1 full minute.

During the assessment the teacher should monitor the students to ensure they can complete the test without extreme fatigue. If students are self-testing, they should work in pairs to promote safety.



The student will record his or her time on the individual record form. Norms can be used to help students assess their measurements. Norms and standards have been included in the Appendix.

Activities to Improve Results: Your fitness program should include activities that use the cardiorespiratory system for 20 or more minutes, three to four times per week. Recommended heart rate levels during the activities should be between 60% and 80% of your maximum heart rate for improvement to occur.

An aerobic warm up should be included in all daily activities. Perform activities including, but not limited to, the following: running, walking, swimming, cross-country skiing, and sports. Aerobic dance activities are highly recommended. Include circuit training as a regular part of your program to promote improvement.

Assessment Activity: Time in the Target Heart Rate (THR) Zone
Fitness Category: Cardiorespiratory Endurance

Testing Procedure:
The student will:

- calculate his or her THR by determining 60% to 80% of his or her maximum heart rate
- do an aerobic activity for a certain amount of time and try to elevate his or her heart rate to stay in the THR zone

An example of this would be to run for 15 minutes. The distance the students are to cover is not important; their goal is to elevate their heart rate to the THR zone and keep it there as long as they are able until the test is over. Maximum heart rate and THR are determined by the following formulas:

220 − age = Max. HR × .60 =
220 − age = Max. HR × .80 = > **THR range of 60–80% of MHR**

The student will record his or her time at the THR zone on the individual record form. Norms can be used to help students assess their measurements. Norms and standards have been included in the Appendix.

Activities to Improve Results: A fitness program that includes activities that use the cardiorespiratory system for 20 or more minutes, three to four times per week. Recommended heart rate levels during the activities should be between 60% and 80% of your maximum heart rate for improvement to occur.

An aerobic warm up should be included in all daily activities. Perform activities including, but not limited to, the following: running, walking, swimming, cross-country skiing, and sports. Aerobic dance activities are highly recommended. Include circuit training as a regular part of your program to promote improvement.

Assessment Activity: Walk Test
Fitness Category: Cardiorespiratory Endurance

Testing Procedure:
The student will:

- walk one mile as quickly as he or she can, but at a pace that can be maintained
- cross the finish line and be given his or her time
- take a 15-second heart rate and multiply by 4 to determine 1-minute pulse rate.

The student's time and heart rate will be entered into a computer that will compute the VO_2 max. The VO_2 max can also be calculated using a special equation.

Estimated VO_2 max (ml/kg/min) = 132.853

- − (0.0769 × body weight [in pounds])
- − (0.3877 × age [years])
- + (6.3150 × gender [female = 0; male = 1])
- − (3.2649 × 1-mile walk time [in minutes and seconds])
- − (0.1565 × 1-minute heart rate at end of mile [beats per minute])

For example, consider a 25-year-old male who weighs 185 pounds, walked a mile in 15:26, and had a heart rate of 175 beats per minute after the walking test.

Estimated VO_2 max (ml/kg/min) = 132.853

−	(0.0769 × 185)	−14.23
−	(0.3877 × 25)	−9.69
+	(6.3150 × 1)	+6.3150
−	$(3.2649 \times 15 + \frac{26}{60})$	−49.40
−	(0.1565 × 175)	−27.39

The answer after this calculation is: = 39.458 ml/kg/min

or go to www.exrx.net/calculators/Rockport.html This site will conduct calculations for you.

The student will record his or her VO_2 max number on the individual record form. Norms can be used to help students assess their measurements. Norms and standards have been included in the Appendix.

Activities to Improve Results: Your fitness program should include activities that use the cardiorespiratory system for 20 or more minutes, three to four times per week. Recommended heart rate levels during the activities should be between 60% and 80% of your maximum heart rate for improvement to occur.

An aerobic warm up should be included in all daily activities. Perform activities including, but not limited to, the following: running, walking, swimming, cross-country skiing, and sports. Aerobic dance activities are highly recommended. Include circuit training as a regular part of your program to promote improvement.

Assessment Activity: Flexed-Arm Hang
Fitness Category: Muscular Endurance

Testing Procedure:
The student will:

- grab the horizontal bar with an overhand grip, palms facing forward
- be assisted so that his or her arms are flexed, chin is above the bar, and body hangs straight down.

A spotter may hold a rigid arm against the student's legs to prevent the student from swinging. As soon as this position is reached, the teacher will start a stopwatch. Time is stopped when the student's chin touches, or goes below the bar, or the head tilts back.

The student will record his or her time on the individual record form. Norms can be used to help students assess their measurements. Norms and standards have been included in the Appendix.

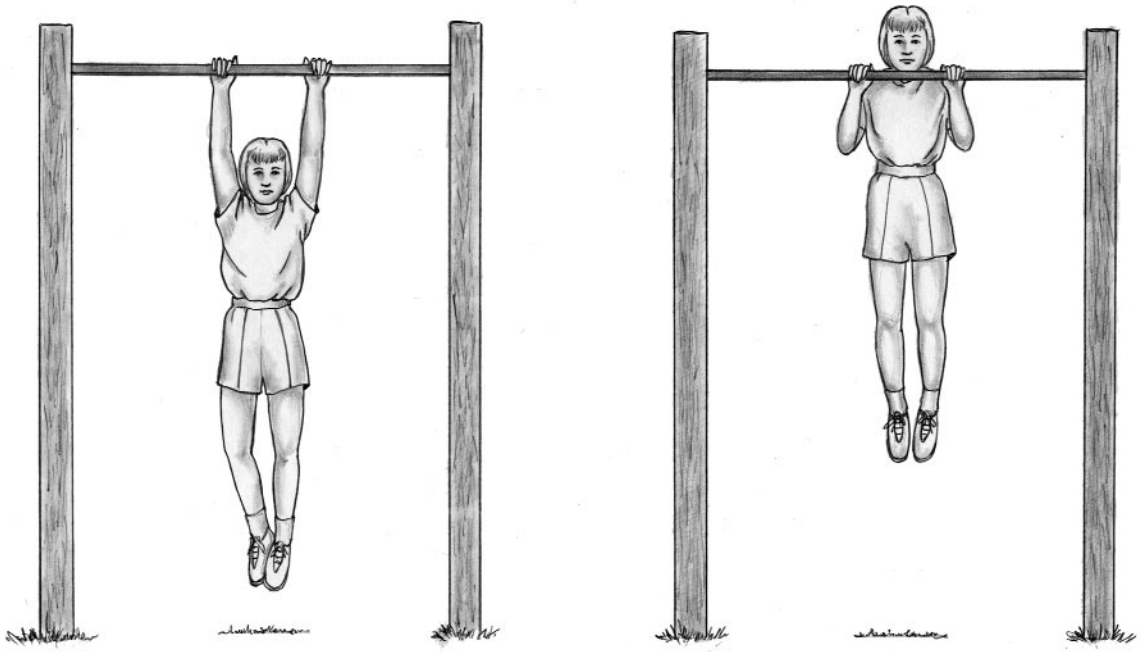
Activities to Improve Results: Perform the flexed-arm hang two or three times a week and do sets of regular pull-ups two to three times a week.

Assessment Activity: Pull-Ups
Fitness Category: Muscular Endurance

Testing Procedure:
The student will:

- grasp a horizontal bar above the head with palms facing forward and arms fully extended
- raise his or her body until the chin is above the bar
- lower him- or herself until the arms are fully extended.

If the student fails to either get the chin above the bar or to fully extend the arms when lowering the body, or if he or she swings or bends the legs to aid the motion, it is a correction. The test ends when the student receives two corrections.



The student will record his or her number completed on the individual record form. Norms can be used to help students assess their measurements. Norms and standards have been included in the Appendix.

Activities to Improve Results: Perform sets of pull-ups and sets of partner-assisted pull-ups and practice the flexed-arm hang two to three times a week.

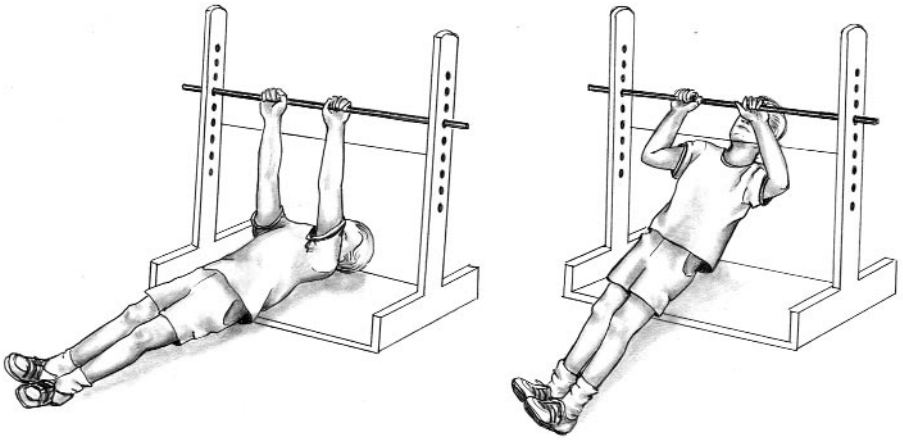
Assessment Activity: Modified Pull-Ups
Fitness Category: Muscular Endurance

Testing Procedure:
The teacher will provide a modified pull-up bar with a parallel elastic band stretched 7 to 8 inches below the bar.

The student will:

- lie facing up under the modified pull-up bar
- be assisted in grabbing the bar with the palms facing toward the feet
- begin with straight arms and only the heels touching the floor
- pull his or her straight body toward the bar until the chin is above the elastic band (an alternate method is to require the student to raise the chin as high as the bar).

If the student stops to rest or fails to keep the body straight, it is a correction. The test ends after the second correction, and the partner will tell the student how many pull-ups were completed.



The student will record his or her number completed on the individual record form. Norms can be used to help students assess their measurements. Norms and standards have been included in the Appendix.

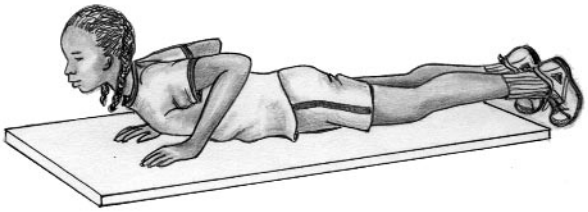
Activities to Improve Results: Perform sets of modified pull-ups two to three times a week.

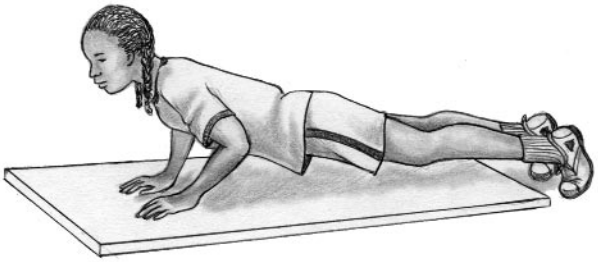
Assessment Activity: Push-Ups
Fitness Category: Muscular Endurance

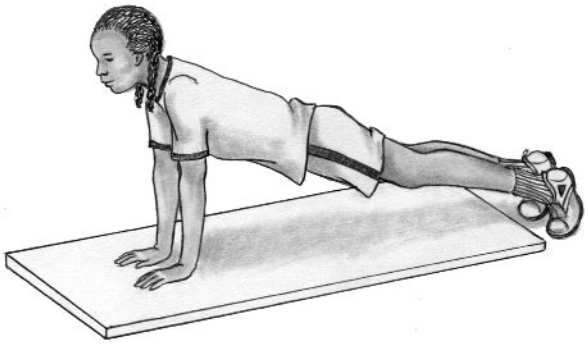
Testing Procedure:
The student will:

- lie face-down on a mat with the hands beneath the shoulders and the palms down and elbows up; the legs will be straight and slightly apart, and the toes will be bent forward
- raise the body until the arms are fully extended, and then lower the body until the upper and lower arms form a right angle (the body should be held in a straight line, from head to heels, during each repetition)
- complete one push-up approximately every three seconds.

The partner will count the number completed. If the student slows to rest, fails to fully extend the arms, or neglects to lower him- or herself until the 90-degree angle is formed, it is a correction. The test ends when the student receives two corrections, and the partner will tell the student how many push-ups were completed.







The student will record his or her number completed on the individual record form. Norms can be used to help students assess their measurements. Norms and standards have been included in the Appendix.

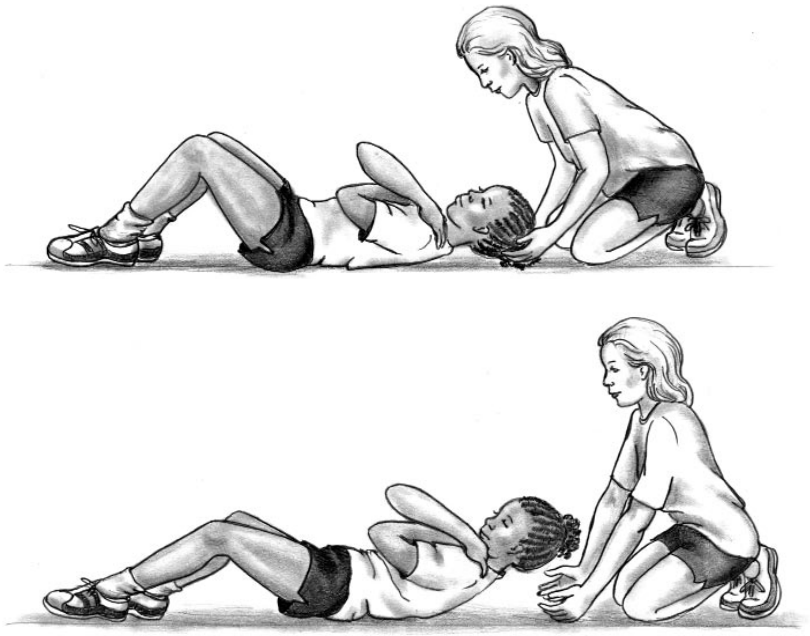
Activities to Improve Results: Perform sets of push-ups or modified push-ups (instead of being on the toes, rest on the knees and perform push-ups) two to three times a week.

Assessment Activity: Curl-Ups
Fitness Category: Muscular Endurance

Testing Procedure:
The student will:

- lie on his or her back on a gym mat with both feet flat on the floor and the knees bent (a partner will hold the head and count how many curl-ups are completed)
- have both arms crossed, with the hands on the opposite shoulders; hands and arms remain in contact with the body; the objective is to isolate the abdominals
- pull his or her belly button toward the spine and flatten the lower back against the floor
- slowly contract his or her abdominals, bringing the shoulder blades one to two inches off the floor
- exhale as he or she comes up, keeping the neck straight and chin up
- return to the starting position.

This is performed for one timed minute.



The student will record his or her number completed on the individual record form. Norms can be used to help students assess their measurements. Norms and standards have been included in the Appendix.

Activities to Improve Results: Perform sets of curl-ups throughout the week.

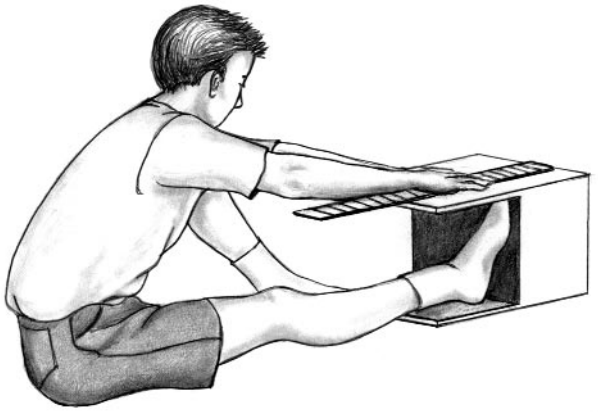
Assessment Activity: Sit-and-Reach
Fitness Category: Flexibility

Testing Procedure:
Prior to participating in flexibility measurements, students should engage in mild cardiorespiratory activities such as brisk walking or slow jogging to warm up muscle groups.

The student will:

- remove shoes, sit on the floor, and place the bottom of one foot against the interior wall of a modified box (the other leg will be bent such that the foot is on the ground a few inches from the inside of the first knee)
- place one hand on top of the other, palms facing down, and slowly lean forward until he or she feels slight discomfort
- repeat this four times and hold the last one for one second so that the partner can measure and record the reach.

The student will repeat the exercise for the other leg. The leg being measured must remain straight, and the hands must move forward evenly. The hips must also remain square to the box.



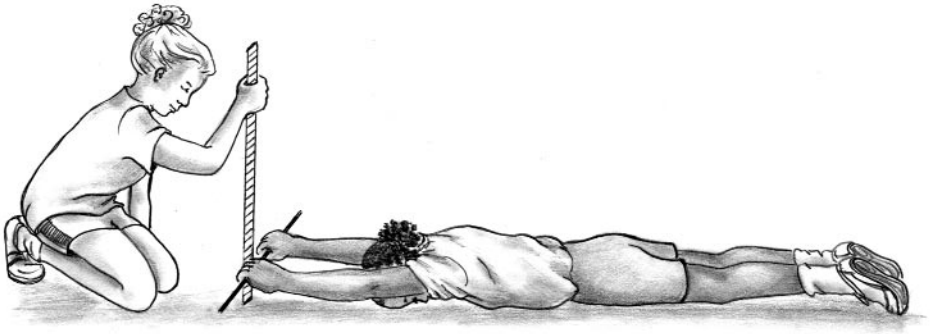
The student will record his or her distances on the individual record form. Norms can be used to help students assess their measurements. Norms and standards have been included in the Appendix.

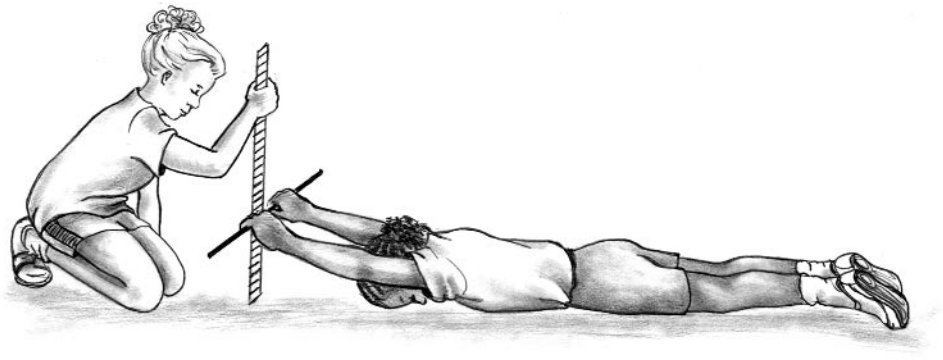
Activities to Improve Results: Stretch on a daily basis, before and after exercising. Develop a stretching routine that will work all the muscles in the body.

Assessment Activity: Trunk Lift (Prone Arm Lift)
Fitness Category: Flexibility

Testing Procedure:
The student will:

- lie face-down holding a ruler or a stick in both hands; fists should be tight and facing down
- raise his or her arms and the stick as high as possible; forehead should remain on the floor and the arms should remain straight
- remain still while a spotter measures the height of the stick with a ruler
- return to resting position.





The spotter will tell the student the distance between the ground and ruler. The student will record the height on the individual record form. Norms can be used to help students assess their measurement. Norms and standards have been included in the Appendix.

Activities to Improve Results: To increase your lower-back strength, perform toe-touching exercises, while using a straight back and bringing the trunk up to a standing position.

Assessment Activity: V Sit-and-Reach
Fitness Category: Flexibility

Testing Procedure:
The teacher will mark two lines on the floor forming a capital "T." The top line of the "T" should measure two feet long. The leg of the "T" is the measuring line and should have inch increments numbered on it, totaling four feet.

The student will:

- remove both shoes
- sit centered on the leg side of the "T"
- overlap his or her hands, so the ends of the fingers are the same, with the palms facing down
- hold the legs eight to twelve inches apart, with both feet immediately behind the top line of the "T"
- lock both knees and reach as far forward as possible.

On the third attempt, the student is told to hold the stretch. The third attempt will be recorded.

The student will record his or her measurement on the individual record form. Norms can be used to help students assess their measurements. Norms and standards have been included in the Appendix.

Activities to Improve Results: Stretch on a daily basis, before and after exercising. Develop a stretching routine that will work all the muscles in the body.

Assessment Activity: Skin Caliper
Fitness Category: Body Composition

Testing Procedure:
The procedure requires a skin-fold caliper. The caliper measures a double layer of fat and skin. The skin fold is measured in three sites:

- on the back of the arm, over the triceps muscle, midway between the elbow and scapula
- in the abdominal area, approximately 1.5 inches on either side of the umbilicus
- on the inside of the calf, at maximum calf girth.

The selected site should be vertical. The teacher grasps the skin and firmly but gently lifts it away from the body tissue.

- Measurements with the caliper are taken one half inch below the pinch site.
- Place the caliper in the middle of the fold and record measurement.
- Each site is measured three times, with the median value recorded.
- Median results from the three skin-fold measurements are to be added, and the body-fat percentage determined by the Body Composition Conversion Chart available from Cooper Institute for Aerobic Research, *Fitnessgram,* or from Corbin & Lindsey's *Fitness for Life*, Fourth Edition. Both are available from Human Kinetics.

The skin caliper measurement does not take into account lean muscle mass. Professional athletes and persons with a more athletic or muscular build may score slightly higher and still have a healthy body-fat percentage.

Activities to Improve Results: Eat a balanced diet that provides appropriate amounts of nutrients based on the food guide pyramid. The percentage of lean body mass can be increased through physical activities including muscle strength and endurance exercises.

Assessment Activity: Body Mass Index (BMI)

Fitness Category: Body Composition

Testing Procedure:

The student will:

- calculate Body Mass Index using his or her weight and height
- convert the weight and height into metric units
- use the following formula to calculate the Body Mass Index:

$$\textbf{Weight (kg) / Height (m)}^2$$

The BMI measurement does not take into account lean muscle mass. Professional athletes and persons with a more athletic or muscular build may score slightly higher and still have a healthy body-fat percentage.

Activities to Improve Results: Eat a balanced diet that provides appropriate amounts of nutrients based on the food guide pyramid. The percentage of lean body mass can be increased through physical activities including muscle strength and endurance exercises.

FITNESSGRAM Standards for Healthy Fitness Zone*

BOYS

Age	One-mile run min: sec	Walk test & VO_2max ml/kg/min	Percent fat	Body mass index	Curl-up # complete	Trunk Lift inches	Push-up # complete	Modified Pull-up # complete	Pull-up # complete	Flexed arm hang # complete	Sit & Reach **
9			25 – 10	20 – 15.2	9 – 24	6 – 12	6 – 15	5 – 11	1 – 2	4 – 10	8
10	11:30 – 9:00	42 – 52	25 – 10	21 – 15.3	12 – 24	9 – 12	7 – 20	5 – 15	1 – 2	4 – 10	8
11	11:00 – 8:30	42 – 52	25 – 10	21 – 15.8	15 – 28	9 – 12	8 – 20	6 – 17	1 – 3	6 – 13	8
12	10:30 – 8:00	42 – 52	25 – 10	22 - 16.0	18 – 36	9 – 12	10 – 20	7 – 20	1 – 3	6 – 13	8
13	10:00 – 7:30	42 – 52	25 – 10	23 – 16.6	21 – 40	9 – 12	12 – 25	8 – 22	1 – 4	12 – 17	8
14	9:30 – 7:00	42 – 52	25 – 10	24.5 – 17.5	24 – 45	9 – 12	14 – 30	9 – 25	2 – 5	15 – 20	8
15	9:00 – 7:00	42 – 52	25 – 10	25 – 18.1	24 – 47	9 – 12	16 – 35	10 – 27	3 – 7	15 – 20	8
16	8:30 – 7:00	42 – 52	25 – 10	26.5 – 18.5	24 – 47	9 – 12	18 – 35	12 – 30	5 – 8	15 – 20	8
17	8:30 – 7:00	42 – 52	25 – 10	27 – 18.8	24 – 47	9 – 12	18 – 35	14 – 30	5 – 8	15 – 20	8
17+	8:30 – 7:00	42 – 52	25 – 10	27.8 – 19	24 – 47	9 – 12	18 – 35	14 – 30	5 – 8	15 –20	8

GIRLS

Age	One-mile run min: sec	Walk test & VO_2max ml/kg/min	Percent fat	Body mass index	Curl-up # complete	Trunk Lift inches	Push-up # complete	Modified Pull-up # complete	Pull-up # complete	Flexed arm hang # complete	Sit & Reach **
9			32 – 17	23 – 16.2	9 – 22	6 – 12	6 – 15	4 – 11	1 – 2	3 – 10	9
10	12:30 - 9:30	15 – 41	32 – 17	23.5 – 16.6	12 – 26	9 – 12	7 – 15	4 – 13	1 – 2	4 – 10	9
11	12:00 – 9:00	15 – 41	32 – 17	24 – 16.9	15 – 29	9 – 12	7 – 15	4 – 13	1 – 2	4 – 10	10
12	12:00 - 9:00	23 – 41	32 – 17	24.5 – 16.9	18 – 32	9 – 12	7 – 15	4 – 13	1 – 2	6 – 12	10
13	11:30 – 9:00	23 – 51	32 – 17	24.5 – 17.5	18 – 32	9 – 12	7 – 15	4 – 13	1 – 2	7 – 12	10
14	11:00 – 8:30	23 – 51	32 – 17	25 – 17.5	18 – 32	9 – 12	7 – 15	4 – 13	1 – 2	8 – 12	10
15	10:30 – 8:00	23 – 51	32 – 17	25 – 17.5	18 – 35	9 – 12	7 – 15	4 – 13	1 – 2	8 – 12	12
16	10:00 – 8:00	32 – 61	32 – 17	25 – 17.5	18 – 35	9 – 12	7 – 15	4 – 13	1 – 2	8 – 12	12
17	10:00 – 8:00	41 – 61	32 – 17	26 – 17.5	18 – 35	9 – 12	7 – 15	4 – 13	1 – 2	8 – 12	12
17+	10:00 – 8:00	41 – 61	32 - 17	27.3 – 18.0	18 – 35	9 – 12	7 – 15	4 – 13	1 – 2	8 – 12	12

*Number on left is lower end of Healthy Fitness Zone; number on right is upper end of Healthy Fitness Zone.

** Test scored Pass/Fail; must reach this distance to pass.

Partial Curl-Ups and V Sit-and-Reach Norms

Age	Partial Curl-Ups	V Sit-and-Reach in Inches (Girls)	V Sit-and-Reach in Inches (Boys)
9	15	2	1
10	20	2	1
11	20	2	1
12	20	2	1
13	25	3	1
14	25	3	1
15	30	3	1
16	30	3	1
17	30	3	1

Maximum and Target Heart Rates by Age

Age	Maximum Heart Rate *	Target Heart Rate Range **
9	211	127–169
10	210	126–168
11	209	125–167
12	208	125–166
13	207	124–166
14	206	124–165
15	205	123–164
16	204	122–163
17	203	122–162

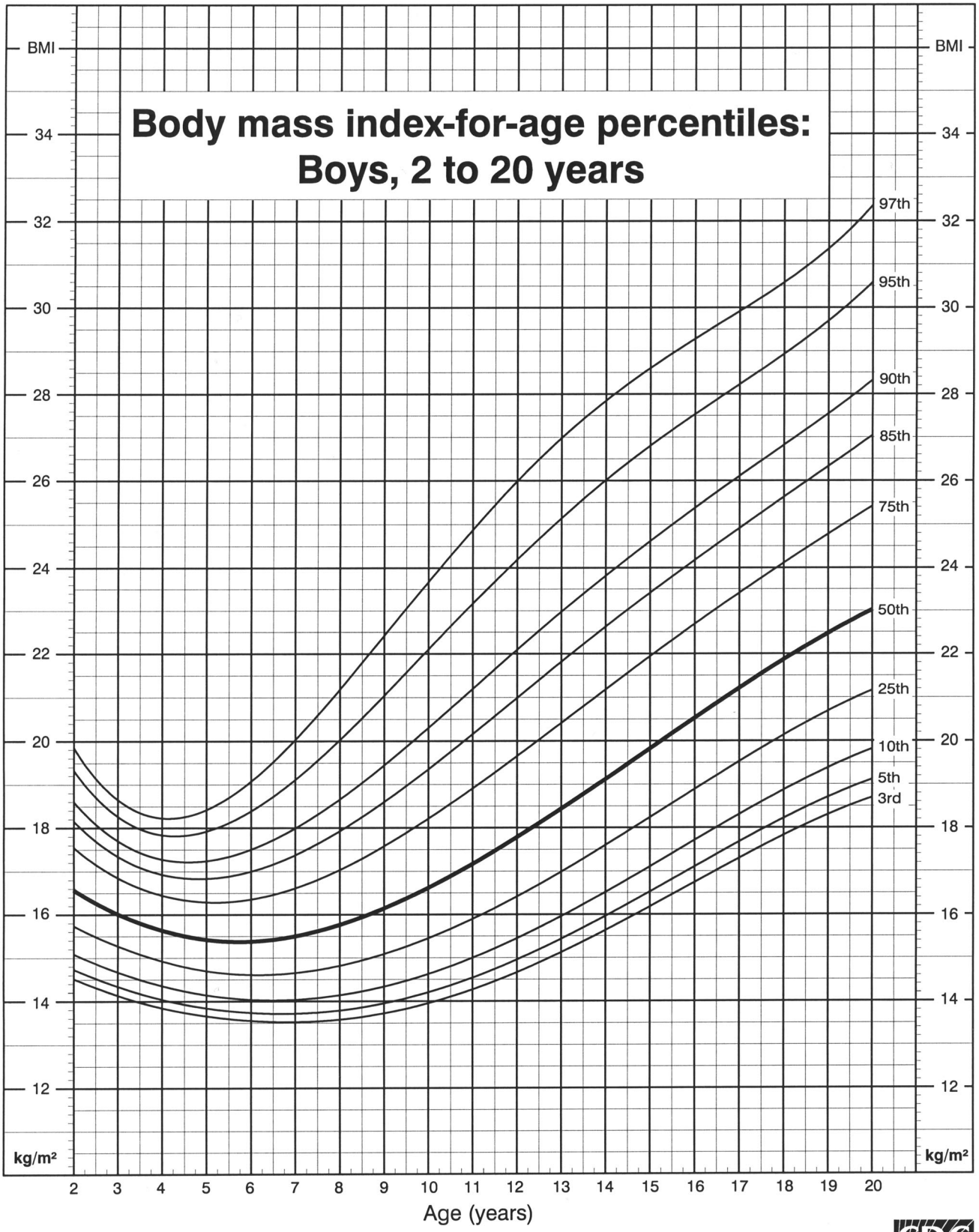
* The Maximum Heart Rate (MHR) is calculated by using the following formula:

MHR = 220 − age

** The Target Heart Rate Range (THR) is calculated by using the following formula:

THR zone = .60 × MHR to .80 × MHR

CDC Growth Charts: United States



Published May 30, 2000.

SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).

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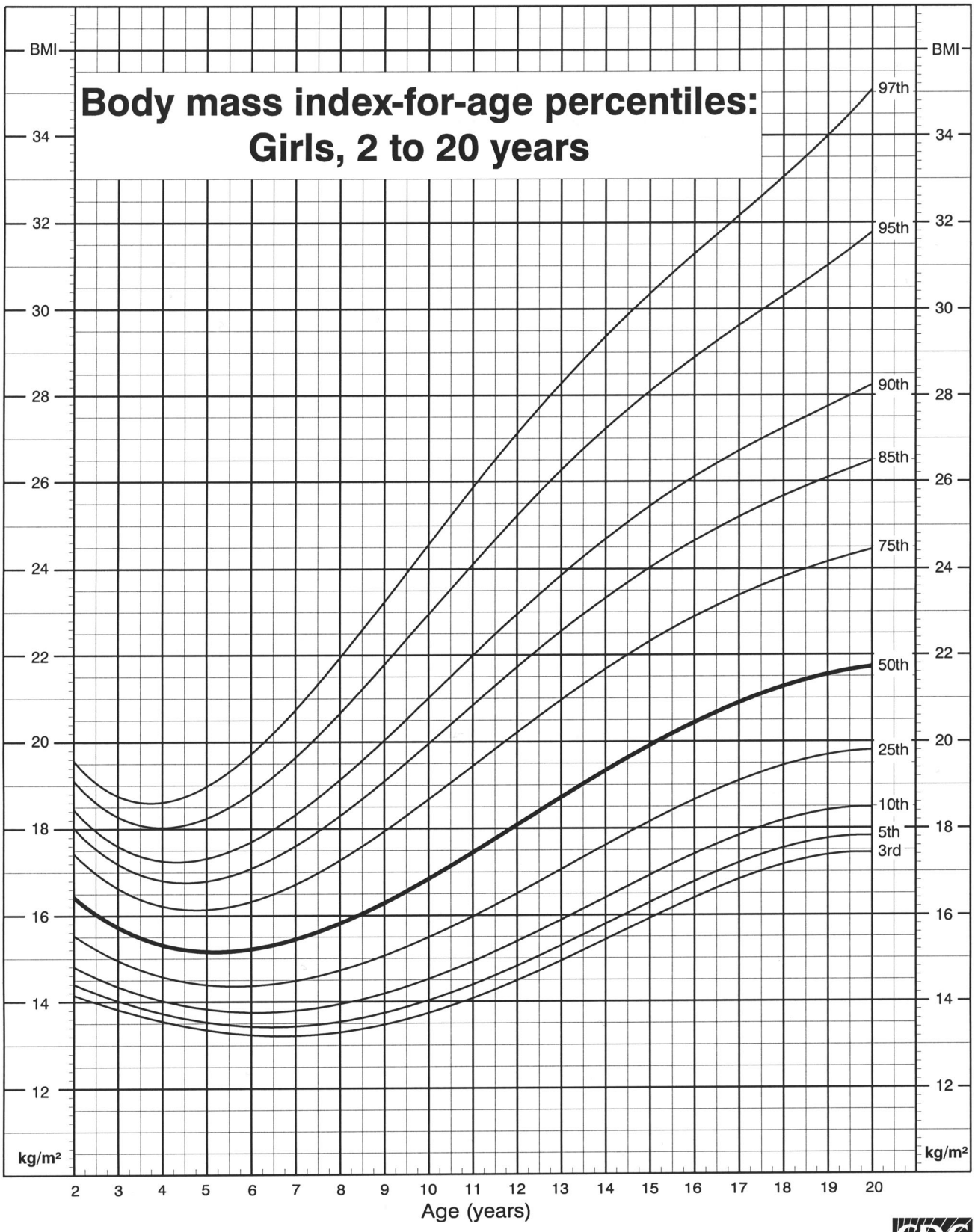
CDC Growth Charts: United States



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