

Physical Fitness Test



Reference Guide

Updated



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Section 1

Introduction and Overview



This reference guide is designed to assist local educational agency (LEA)¹ staff in becoming familiar with the California Physical Fitness Test (PFT). The PFT is a comprehensive, health-related battery of physical fitness tests for students in California.

This guide includes a detailed description of each fitness area tested and suggestions for facilitating the administration of each test. Following each description are tables that display the data collection requirements, the performance standards by age and gender, and, if available, the formulas used to generate the scores.

Please note that this guide is not designed as a replacement for the *FITNESSGRAM*[®]/*ACTIVITYGRAM*[®] *Test Administration Manual*.² This can be found on the Cooper Institute's website at <https://www.cooperinstitute.org/vault/2440/web/files/662.pdf>.

California *Education Code (EC)* Section 60800 requires all LEAs to administer the PFT annually, February 1 through May 31, to public school students in grades five, seven, and nine. LEAs may request a California State Board of Education (SBE) waiver to administer the PFT outside the designated testing window. Students are required to take the PFT whether or not they are enrolled in a physical education class or participate in a block schedule.

FITNESSGRAM[®]

The SBE designated the *FITNESSGRAM*[®] as the PFT for students in California public schools. The *FITNESSGRAM*[®] is designed to assess the three main categories of fitness: (1) aerobic capacity; (2) muscular skeletal fitness; and (3) body composition. It is composed of the following six key fitness areas:

- Aerobic Capacity
- Body Composition
- Abdominal Strength and Endurance
- Trunk Extensor Strength and Flexibility
- Upper Body Strength and Endurance
- Flexibility

A level of fitness in these six areas offers a degree of defense against diseases that are associated with inactivity. The test results can be used by students, teachers, and parents/guardians to monitor overall fitness and evaluate their LEA's physical education program.

¹ Throughout this manual, LEAs include school districts, county offices of education, and charter schools that are independent for assessment purposes (i.e., independent charter schools).

² Throughout this manual, the *FITNESSGRAM*[®]/*ACTIVITYGRAM* Test Administration Manual (Revised Updated Fourth Edition) is referred to as the *FITNESSGRAM*[®] Test Administration Manual.

Performance Standards

The FITNESSGRAM® uses health-related standards to evaluate performance. The desired performance standard for each fitness-area test is the Healthy Fitness Zone (HFZ). This standard represents the level of fitness associated with good health. Students should strive to achieve a score within the HFZ for each fitness-area test.

Commencing with the 2018–19 PFT administration, the PFT recognizes a third gender choice of nonbinary. While the California Department of Education (CDE) continues to encourage The Cooper Institute to develop standards for our nonbinary students, the PFT performance standards of the FITNESSGRAM® are based on female and male biological sexes; therefore, the “Status” fields on the student scored reports for the students who identify as nonbinary will be blank. LEAs may assist students in assessing their PFT performance by comparing their scores to current Healthy Fitness Zone charts available at <https://www.cde.ca.gov/ta/tg/pf/healthfitzones.asp>.

Although the FITNESSGRAM® Scientific Advisory Board’s position statement titled “Gender Uses in FITNESSGRAM®,” maintains that the use of a child’s sex at birth is still the preferred method to obtain the most accurate FITNESSGRAM® results, California law provides transgender students equal access to activities and facilities on the basis of their gender identity. The CDE recommends administering the PFT in accordance with the student’s identified gender and use the performance standards associated with the identified gender. The following is an excerpt from the aforementioned position statement:

Emphasis on assessments should be placed on self-monitoring and tracking improvement over time. However, if standards are to be applied to transgender, gender-neutral (non-binary), or students identifying differently than their sex at birth, FITNESSGRAM® results would be most accurate using the child’s sex at birth. This is because of the differential effects and timing of maturation and not due to other social and cultural differences between males and females.

That being said, it is also up to the parents, students, and teachers to determine what is in the best interest of a student’s wellbeing. If using the sex at birth would cause undue emotional stress upon the student, then it is up to the teacher and/or parent/guardian to determine which gender identity is the most appropriate. Teachers should maintain complete confidentiality and sensitivity when implementing and recording results for all students regardless of gender identity.

In addition, the CDE recommends that LEAs reference local policies or legal counsel at the local level as it relates to the performance standards.

As part of PFT administration, LEAs are required to collect student-level demographic data and submit that data to the state. The CDE PFT Office does not change any student-level data received from LEAs nor must PFT data match student enrollment data.

The FITNESSGRAM® performance standards are updated on a regular basis. The current-year standards should always be used and are included in tables throughout this reference guide. They are posted in stand-alone versions on the CDE PFT FITNESSGRAM®: Healthy Fitness Zone Charts web page at <http://www.cde.ca.gov/ta/tg/pf/healthfitzones.asp>.

Each student's performance is classified by the HFZ or other zones, depending on the fitness area, as follows:

Aerobic capacity

- Healthy Fitness Zone
- Needs Improvement
- Needs Improvement—Health Risk

Body composition

- Very Lean
- Healthy Fitness Zone
- Needs Improvement
- Needs Improvement—Health Risk

Muscle strength, endurance, and flexibility

- Healthy Fitness Zone
- Needs Improvement

The "Needs Improvement," or "NI," designation signifies a fitness area in which a student's score is not in the HFZ. The student would benefit from physical activities designed to improve performance in the designated fitness area to achieve the HFZ. "NI—Health Risk" specifically indicates increased health risks because of the student's level of fitness.

It is possible that some students' scores will exceed the HFZ. For Body Composition, this is designated as the Very Lean Zone. It is important that students and their parents or guardians be aware if Body Composition scores place them in the Very Lean Zone.

Administration Information

Most of the FITNESSGRAM® tests can be administered in a space equivalent to the size of most classrooms. The test options for Aerobic Capacity require the greatest amount of space. One of these options, the Progressive Aerobic Cardiovascular Endurance Run (PACER), requires a space that can accommodate the 15-meter (15m) or 20-meter (20m) distance needed to carry out the test. Schools with limited space may consider using one of the following options:

- Classroom, lunchroom, auditorium, or other similar space
- Physical education facility on another school campus
- Local park and recreation facility

LEAs should review their confidentiality practices to make sure that appropriate protocols are in place to ensure as much privacy as possible when administering the PFT (e.g., screens to avoid observation of measurements—especially body composition measurements) and to safeguard PFT results from students other than the one being tested. In addition, LEAs should develop a receptive process to ensure the safety and concerns of their students and students' parents or guardians by being sensitive to such variables as preexisting special needs, body composition, and maturation stage of the students.

Testing Students with Disabilities

Certain variations or accommodations may be provided for students with disabilities who need special assistance on the PFT. Variations and accommodations should be specified in the student's individualized education program (IEP) or Section 504 plan. "Matrix 2: Matrix of Variations, Accommodations, and Modifications for Administration of the PFT" provides a list of the types of variations and accommodations that are available for the PFT. This matrix is posted on the CDE Assessment Information web page at <http://www.cde.ca.gov/ta/tg/ai/>, under the "Testing Matrices" section.

Most of the fitness areas of the FITNESSGRAM provide two or three test options, so most students, including those with disabilities, have the opportunity to participate in the PFT. All students with disabilities who are unable to take the entire PFT should be given as much of the test as each student's physical condition permits.

The IEP or Section 504 plan team is responsible for deciding how students with disabilities will participate in the PFT. PFT data should be included for every student, even if they do not take the physical portion of the test. Demographic data should be submitted and the data field(s) for the fitness areas(s) the student did not participate in should be left **blank**.

Section 2

Fitness Areas and Tests



Aerobic Capacity

Three test options are provided under the Aerobic Capacity test area:

- One-Mile Run
- 20-Meter Progressive Aerobic Cardiovascular Endurance Run (20m PACER)
- Walk Test

All test options under the Aerobic Capacity test area are reported in terms of VO_2 Max, which is a measure of maximum oxygen consumption during exercise. Tables 1 and 2, on the following page, present information about the HFZs for Aerobic Capacity. Additional information about Aerobic Capacity and VO_2 Max can be found in the video provided by The Cooper Institute at <https://www.youtube.com/watch?v=eiS8xGzRlwl>.

Physical education teachers can calculate VO_2 Max for any of the Aerobic Capacity test options by using the calculator provided in an Excel spreadsheet that is available on the CDE PFT web page at <http://www.cde.ca.gov/ta/tg/pf/>.

The FITNESSGRAM® and HFZs are registered trademarks of The Cooper Institute. VO_2 Max refers to the maximum oxygen consumption for an individual during exercise. The acronym is derived from V = volume per time, O = oxygen, and max = maximum.

Participation

Students who score an "insufficient" in Aerobic Capacity are considered as having participated in Aerobic Capacity when the scoring program calculates a student's participation level.

Administration Tips for the Aerobic Capacity Tests



- Practice pacing and techniques for heart rate monitoring.
- Allow students adequate time to warm up and cool down.
- To avoid potential health and safety issues, do not administer a test in unusually high temperatures or humidity or when the wind is strong.

Table 1. HFZs for Aerobic Capacity for Females*

Age	NI–Health Risk	NI	HFZ
10	≤ 37.3	37.4 – 40.1	≥ 40.2
11	≤ 37.3	37.4 – 40.1	≥ 40.2
12	≤ 37.0	37.1 – 40.0	≥ 40.1
13	≤ 36.6	36.7 – 39.6	≥ 39.7
14	≤ 36.3	36.4 – 39.3	≥ 39.4
15	≤ 36.0	36.1 – 39.0	≥ 39.1
16	≤ 35.8	35.9 – 38.8	≥ 38.9
17	≤ 35.7	35.8 – 38.7	≥ 38.8
17+	≤ 35.3	35.4 – 38.5	≥ 38.6

*As there are no nonbinary standards, nonbinary students may compare their scores to this chart to assess their performance.

VO₂Max standards are not available for students ages five through nine.

Table 2. HFZs for Aerobic Capacity for Males *

Age	NI–Health Risk	NI	HFZ
10	≤ 37.3	37.4 – 40.1	≥ 40.2
11	≤ 37.3	37.4 – 40.1	≥ 40.2
12	≤ 37.6	37.7 – 40.2	≥ 40.3
13	≤ 38.6	38.7 – 41.0	≥ 41.1
14	≤ 39.6	39.7 – 42.4	≥ 42.5
15	≤ 40.6	40.7 – 43.5	≥ 43.6
16	≤ 41.0	41.1 – 44.0	≥ 44.1
17	≤ 41.2	41.3 – 44.1	≥ 44.2
17+	≤ 41.2	41.3 – 44.2	≥ 44.3

* As there are no nonbinary standards, nonbinary students may compare their scores to this chart to assess their performance.

VO₂Max standards are not available for students ages five through nine.

One-Mile Run

The One-Mile Run estimates aerobic capacity from running performance. Students are instructed to run a mile as fast as they are able. Walking is permitted for students who cannot run the total distance. The time taken to complete the run is recorded in minutes and seconds. Table 3, below, presents the data collection requirements for the One-Mile Run.

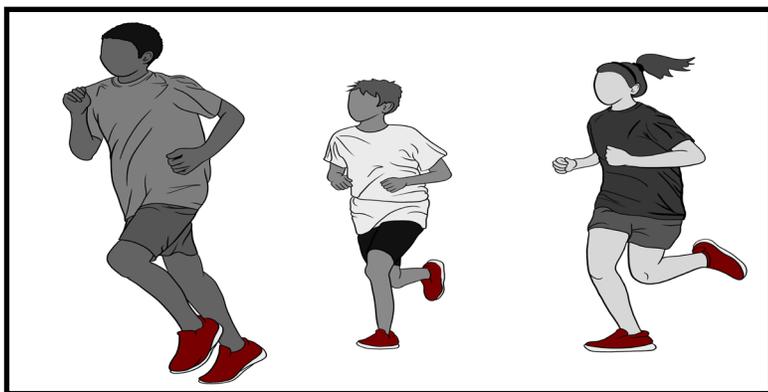


Table 3. One-Mile Run: Data Collection Requirements:

Data	Gender	Age	Height (feet)	Height (inches)	Weight (pounds)	Time (minutes)	Time (seconds)
Acceptable values	Male (M), female (F), nonbinary (N)	Age requires the student's date of birth and PFT start date. Age will be calculated automatically by the system as the student's age on the first day of testing.	3–7	0–11	30–400	3–59	0–59

Additional scoring rules for the One-Mile Run:

- A time of 59 minutes and 59 seconds should be used to indicate students who attempted the test but did not complete it. Students with 59 minutes and 59 seconds will be scored "insufficient" (I) and reported as "Needs Improvement."
- The time for grade five students who are younger than age nine will not be scored but will be reported in the HFZ regardless of their One-Mile Run time or number of laps completed. The time for grade five students who are age nine will be scored and reported using the standards for students who are age ten.

One-Mile Run equation:

$$VO_2\text{Max} = (.21 * \text{age} * \text{gender}) - (.84 * \text{BMI}) - (8.41 * \text{time}) + (.34 * \text{time} * \text{time}) + 108.94^1$$

- Gender = 1 for males and 0 for females²
- Time is in minutes. One-Mile Run time = One-Mile Run minutes + (One-Mile Run seconds/60) [this will convert One-Mile Run time to a decimal]; example: 4 minutes and 30 seconds converts to 4 + (30/60) = 4.5

¹ Cureton, K. J.; M. A. Sloniger ; J. P. O'Bannon; Black, D. M.; and W. P. McCormack 1995. "A Generalized Equation for the Prediction of VO₂ Peak from One-Mile Run/Walk Performance." *Medicine and Science in Sports and Exercise* 27: 445–51.

² As there are no standards for students who identify as nonbinary, nonbinary students may consult these formulas to calculate their scores.

- Body mass index (BMI) = Weight / (Height * Height)
 - ◆ Height = .3048 * (feet) + .0254 * (inches) *[this will convert height from feet and inches to meters]*
 - Weight = 0.45359237 * (pounds) *[this will convert weight from pounds to kilograms]*

20-Meter (20m) PACER

The 20m PACER estimates aerobic capacity from the number of laps (20 meters in distance) that are completed. Unlike the other two Aerobic Capacity options, the PACER starts out easy and becomes progressively more difficult.

For this test, a pair of parallel lines are drawn 20 meters apart. Students start on one line, run the distance, and touch the opposite line with one foot. Once they hear the sound of a single beep, students turn around and run back to the starting line. Every minute, as indicated by a triple beep, the pace gets faster. Students continue in this manner until they fail twice to touch the line before they hear the beep. Table 4 below presents the data collection requirements for the 20-Meter Pacer.

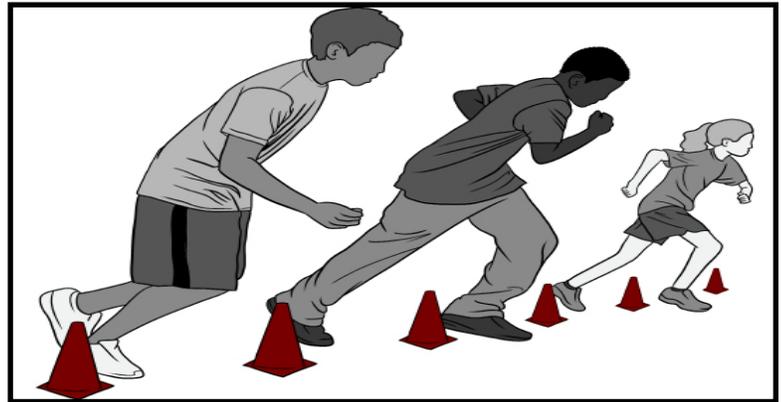


Table 4. 20-Meter Pacer: Data Collection Requirements:

Data	Gender	Age	Laps
Acceptable values	M, F, N	Age requires the student's date of birth and PFT start date. Age will be calculated automatically by the system as the student's age on the first day of testing.	1–190

Additional scoring rules for the PACER:

- In the proper administration of the PACER, a student is allowed two form breaks with the first form break counting as a lap. A student who commits two form breaks after the start of the PACER should be scored as completing one lap.
- If the 15-meter (15m) PACER is administered, the 15m PACER laps first need to be converted to 20-meter laps. The PACER Conversion Chart is located in the *FITNESSGRAM® Test Administration Manual*.
- The time for grade five students who are younger than age nine will not be scored, but will be reported in the HFZ regardless of the One-Mile Run time or number of laps completed.
- The time for grade five students who are age nine will be scored and reported using the standards for students age ten.

PACER equation:

The formula for scoring the PACER using laps, age, and gender is proprietary to Human Kinetics and The Cooper Institute; therefore, it is not published in this guide.

To assist with local scoring, the CDE has included the PACER calculation in an Excel spreadsheet, available on the CDE PFT web page at <http://www.cde.ca.gov/ta/tg/pf/pftresources.asp>. For additional information including the gender, age, and number of laps needed to meet the PACER HFZ, see the “PACER Goal Setting Table” below.

PACER Goal Setting Table

The PACER is one of the three Aerobic Capacity test options available in the FITNESSGRAM®. The PACER is reported in terms of VO₂Max; however, beginning in 2013–14, HFZs are based on student gender, age, and laps only. This table provides the minimum number of 20m laps that students need to achieve the HFZ for the PACER, and the corresponding VO₂Max. Although students can set goals based on the minimum number of PACER laps, teachers are encouraged to discuss the importance of aerobic capacity and to ensure that students understand how VO₂Max is influenced by gender and age. As there are no nonbinary standards, nonbinary students may compare their scores to these charts to assess their performance. Table 5 and 6, below and on the following page, present the HFZs for the 20m PACER.

FEMALES

Table 5. 20m PACER Healthy Fitness Zones for females*

Age	Minimum Number of 20m PACER Laps	Aerobic Capacity HFZ VO ₂ max
10	17	≥ 40.2
11	20	≥ 40.2
12	23	≥ 40.1
13	25	≥ 39.7
14	27	≥ 39.4
15	30	≥ 39.1
16	32	≥ 38.9
17	35	≥ 38.8
17+	38	≥ 38.6

* As there are no nonbinary standards, nonbinary students may compare their scores to this chart to assess their performance.

MALES

Table 6. 20m PACER Healthy Fitness Zones for males*

Age	Minimum Number of 20m PACER Laps	Aerobic Capacity HFZ VO ₂ max
10	17	≥ 40.2
11	20	≥ 40.2
12	23	≥ 40.3
13	29	≥ 41.1
14	36	≥ 42.5
15	42	≥ 43.6
16	47	≥ 44.1
17	50	≥ 44.2
17+	54	≥ 44.3

* As there are no nonbinary standards, nonbinary students may compare their scores to this chart to assess their performance.

Walk Test

The Walk Test estimates aerobic capacity from heart rate response to a one-mile walk. Students are instructed to walk one mile as fast as possible. Immediately after the walk, the heart rate is determined. This heart rate (heart beats per minute) is used along with the total walk time (minutes and seconds) and the weight of the student to estimate aerobic capacity. Table 7, below, present the data collection requirements for the Walk Test.



Table 7. Walk Test: Data Collection Requirements

Data	Gender	Age	Heart Rate (# of beaths per minute)	Weight (pounds)	Time (minutes)	Time (seconds)
Acceptable values	M, F, N	Age requires the student's date of birth and PFT start date. Age will be calculated automatically by the system as the student's age on the first day of testing.	30–250	30–400	3–59	0–59

Additional scoring rules for the Walk Test:

- A time of 59 minutes and 59 seconds should be used to indicate students who attempted the test but did not complete it. Students with 59 minutes and 59 seconds will be scored insufficient (I) and reported as Needs Improvement.
- **The Walk Test is allowed only for students who are ages thirteen and older.** If the Walk Test is given to students younger than age thirteen, it cannot be scored and will not be reported, as Walk Test HFZs have not been established for students younger than age thirteen.

Walk Test equation:

$$\text{VO}_2\text{Max} = 132.853 + (6.315 * \text{gender}) - (.0769 * \text{weight}) - (.3877 * \text{age}) - (3.2649 * \text{time}) - (.1565 * \text{heart rate})^1$$

- Gender = 1 for males and 0 for females²
- Time is in minutes. Walk Test time = Walk Test minutes + (Walk Test seconds/60) [this will convert One-Mile Run time to a decimal] Example: 5 minutes and 45 seconds converts to 5 + (45/60) = 5.75.

Body Composition

Three test options are provided under the Body Composition test area:

- Skinfold Measurements
- Bioelectric Impedance Analyzer
- Body Mass Index (BMI)

The Body Composition fitness area targets the various factors that contribute to an individual's total weight (i.e., percent of muscle, bone, organ, and fat content). Body Composition assessments estimate the level of body fat or the appropriateness of a student's weight relative to the student's height. The HFZs for the body composition test options reflect the natural developmental trends for females and males, with boys gaining muscle and girls tending to gain body fat through the adolescent years. Tables 7, 8, 9 and 10, on the following page, present the HFZs for the Body Composition fitness area.

¹ Kline, G. M.; J. P Porcari; R. Hintermeister; P. S. Freedson; A. Ward; R.F. McCarron et al. 1987. "Estimation of VO₂Max from a One-Mile Track Walk, Gender, Age, and Body Weight." *Medicine and Science in Sports and Exercise* 19(3): 253–59.

² As there are no nonbinary standards, nonbinary students may use this formula to assess their performance.

Healthy Fitness Zones for Body Composition*

Females

Table 8. Skinfold Measurements/Bioelectric Impedance Analyzer - Percent Body Fat

Age	NI-Health Risk	NI	HFZ	Very Lean
5	≥ 28.4	≥ 20.9	20.8 – 9.8	≤ 9.7
6	≥ 28.4	≥ 20.9	20.8 – 9.9	≤ 9.8
7	≥ 28.4	≥ 20.9	20.8 – 10.1	≤ 10.0
8	≥ 28.4	≥ 20.9	20.8 – 10.5	≤ 10.4
9	≥ 30.8	≥ 22.7	22.6 – 11.0	≤ 10.9
10	≥ 33.0	≥ 24.4	24.3 – 11.6	≤ 11.5
11	≥ 34.5	≥ 25.8	25.7 – 12.2	≤ 12.1
12	≥ 35.5	≥ 26.8	26.7 – 12.7	≤ 12.6
13	≥ 36.3	≥ 27.8	27.7 – 13.4	≤ 13.3
14	≥ 36.8	≥ 28.6	28.5 – 14.0	≤ 13.9
15	≥ 37.1	≥ 29.2	29.1 – 14.6	≤ 14.5
16	≥ 37.4	≥ 29.8	29.7 – 15.3	≤ 15.2
17	≥ 37.9	≥ 30.5	30.4 – 15.9	≤ 15.8
17+	≥ 38.6	≥ 31.4	31.3 – 16.5	≤ 16.4

Table 9. Body Mass Index

Age	NI-Health Risk	NI	HFZ	Very Lean
5	≥ 18.5	≥ 16.9	16.8 – 13.6	≤ 13.5
6	≥ 19.2	≥ 17.3	17.2 – 13.5	≤ 13.4
7	≥ 20.2	≥ 18.0	17.9 – 13.6	≤ 13.5
8	≥ 21.2	≥ 18.7	18.6 – 13.7	≤ 13.6
9	≥ 22.4	≥ 19.5	19.4 – 14.0	≤ 13.9
10	≥ 23.6	≥ 20.4	20.3 – 14.3	≤ 14.2
11	≥ 24.7	≥ 21.3	21.2 – 14.7	≤ 14.6
12	≥ 25.8	≥ 22.2	22.1 – 15.2	≤ 15.1
13	≥ 26.8	≥ 23.0	22.9 – 15.7	≤ 15.6
14	≥ 27.7	≥ 23.7	23.6 – 16.2	≤ 16.1
15	≥ 28.5	≥ 24.4	24.3 – 16.7	≤ 16.6
16	≥ 29.3	≥ 24.9	24.8 – 17.1	≤ 17.0
17	≥ 30.0	≥ 25.0	24.9 – 17.5	≤ 17.4
17+	≥ 30.0	≥ 25.0	24.9 – 17.8	≤ 17.7

Males

Table 10. Skinfold Measurements/Bioelectric Impedance Analyzer - Percent Body Fat

Age	NI-Health Risk	NI	HFZ	Very Lean
5	≥ 27.0	≥ 18.9	18.8 – 8.9	≤ 8.8
6	≥ 27.0	≥ 18.9	18.8 – 8.5	≤ 8.4
7	≥ 27.0	≥ 18.9	18.8 – 8.3	≤ 8.2
8	≥ 27.0	≥ 18.9	18.8 – 8.4	≤ 8.3
9	≥ 30.1	≥ 20.7	20.6 – 8.7	≤ 8.6
10	≥ 33.2	≥ 22.5	22.4 – 8.9	≤ 8.8
11	≥ 35.4	≥ 23.7	23.6 – 8.8	≤ 8.7
12	≥ 35.9	≥ 23.7	23.6 – 8.4	≤ 8.3
13	≥ 35.0	≥ 22.9	22.8 – 7.8	≤ 7.7
14	≥ 33.2	≥ 21.4	21.3 - 7.1	≤ 7.0
15	≥ 31.5	≥ 20.2	20.1 – 6.6	≤ 6.5
16	≥ 31.6	≥ 20.2	20.1 – 6.5	≤ 6.4
17	≥ 33.0	≥ 21.0	20.9 – 6.7	≤ 6.6
17+	≥ 35.1	≥ 22.3	22.2 – 7.0	≤ 6.9

Table 11. Body Mass Index

Age	NI-Health Risk	NI	HFZ	Very Lean
5	≥ 18.1	≥ 16.9	16.8 – 13.9	≤ 13.8
6	≥ 18.8	≥ 17.2	17.1 – 13.8	≤ 13.7
7	≥ 19.6	≥ 17.7	17.6 – 13.8	≤ 13.7
8	≥ 20.6	≥ 18.3	18.2 – 14.0	≤ 13.9
9	≥ 21.6	≥ 19.0	18.9 – 14.2	≤ 14.1
10	≥ 22.7	≥ 19.8	19.7 – 14.5	≤ 14.4
11	≥ 23.7	≥ 20.6	20.5 – 14.9	≤ 14.8
12	≥ 24.7	≥ 21.4	21.3 – 15.3	≤ 15.2
13	≥ 25.6	≥ 22.3	22.2 – 15.8	≤ 15.7
14	≥ 26.5	≥ 23.1	23.0 – 16.4	≤ 16.3
15	≥ 27.2	≥ 23.8	23.7 – 16.9	≤ 16.8
16	≥ 27.9	≥ 24.6	24.5 – 17.5	≤ 17.4
17	≥ 28.6	≥ 25.0	24.9 – 18.1	≤ 18.0
17+	≥ 29.3	≥ 25.0	24.9 – 18.6	≤ 18.5

* As there are no nonbinary standards, nonbinary students may compare their scores to these charts to assess their performance.

Skinfold Measurements

The Skinfold Measurements fitness area estimates body fat by taking the median, or middle, value from three ordered measurements of the thickness of skinfolds on the triceps and calf of the right side of the body. A device called a skinfold caliper is used to take these measurements.

Using the Body Composition Conversion Chart (found in the *FITNESSGRAM® Test Administration Manual*), the combined measurements are converted to percentages of body fat. The CDE also accepts percentage of body fat obtained from automated skinfold calipers. Automated skinfold calipers are computerized devices used to acquire, calculate, and display the percentage of body fat together with computer-entered data, such as age and gender. Table 12 below presents the data collection requirements for the Skinfold Measurements.



Administration Tips for the Skinfold Measurement Test



- Be sure the examiner has practiced taking skinfold measurements.
- Whenever possible, the same examiner should administer the skinfold measurements to the same students for subsequent tests.

Table 12. Skinfold Measurements: Data Collection Requirements

Data	Gender	Age	Triceps (median value in millimeters)	Calf (median value in millimeters)
Acceptable values	M, F, N	Age requires the student's date of birth and PFT start date. Age will be calculated automatically by the system as the student's age on the first day of testing.	1–40	1–40

Skinfold measurement equation:¹

$$\text{Males percent body fat} = (0.735 * [\text{triceps value} + \text{calf value}]) + 1.0$$

$$\text{Females percent body fat} = (0.610 * [\text{triceps value} + \text{calf value}]) + 5.0^2$$

¹ As there are no nonbinary standards, nonbinary students may use these formulas to calculate their results.

² Slaughter, M. H., Lohman, T. G., Boileau, R. A., Horswill, C. A., Stillman, R. J., Van Loan, M. D., & Bembien, D. A. . "Skinfold Equations for Estimation of Body Fatness in Children and Youth." *Human Biology* (1988): 60 709-23.

- Triceps value = median value from three skinfold measurements from triceps site
- Calf value = median value from three skinfold measurements from calf site

Bioelectric Impedance Analyzer

The Bioelectric Impedance Analyzer (BIA) measures resistance to the flow of an electrical signal in the body. The device sends a safe, low-energy electrical signal through the body and generates an index of resistance. This resistance value is used by the device along with other values, such as height, weight, age, and gender, to generate an estimate of body fat.



Various BIA devices that are available are affordable, easy to use, and accurate enough for use on the FITNESSGRAM.® Percent body fat must be reported to the nearest tenth of a percent. Table 13, below, presents the data collection requirements for the BIA.



Administration Tip for the Bioelectric Impedance Analyzer Test

Be sure the examiner has practiced taking measurements using the Bioelectric Impedance Analyzer.

Table 13. Bioelectric Impedance Analyzer: Data Collection Requirement

Data	Gender	Age	Percent Body Fat (to nearest tenth of a decimal)
Acceptable values	M, F, N	Age requires the student's date of birth and PFT start date. Age will be calculated automatically by the system as the student's age on the first day of testing.	0.1–99.9

Body Mass Index

The BMI is not an estimate of body fat. Instead, it provides information on the association between a student’s weight relative to the student’s height. The BMI is not the recommended body composition test, particularly for some students with high muscle mass; however, it is available because there may be local policies limiting skinfold measurements. Table 14, below, presents the data collection requirements for the Body Mass Index.



Administration Tip for the Body Mass Index Test

Privacy should be provided to a student when measuring the student’s height and weight.

Table 14. Body Mass Index: Data Collection Requirements

Data	Gender	Age	Height (feet)	Height (inches)	Weight (pounds)
Acceptable values	M, F, N	Age requires the student’s date of birth and PFT start date. Age will be calculated automatically by the system as the student’s age on the first day of testing.	3–7	0–11	30–400

BMI equation:

$$\text{BMI} = \text{Weight} / (\text{Height} * \text{Height})$$

- Height = .3048 * (feet) + .0254 * (inches) [this will convert height from feet and inches to meters]
- Weight = 0.45359237 * (pounds) [this will convert weight from pounds to kilograms]

Muscle Strength, Endurance, and Flexibility

The Muscle Strength, Endurance, and Flexibility fitness area determines the health status of the musculoskeletal system. Balanced, healthy functioning of this system requires that muscles work forcefully over a period of time and be flexible enough to have a full range of motion at the joints.

To determine the health level of the musculoskeletal system, four major areas are tested:

- Abdominal strength and endurance
- Upper body strength and endurance
- Trunk extensor strength and flexibility
- Flexibility

Abdominal Strength and Endurance

One test option is provided under the Abdominal Strength and Endurance test area—the Curl-Up. Table 15 presents the Healthy Fitness Zones for the Abdominal Strength and Endurance fitness area.

Table 15. Healthy Fitness Zones for Abdominal Strength and Endurance*

Age	Females Curl-Up # completed HFZ	Males Curl-Up # completed HFZ
5	≥ 2	≥ 2
6	≥2	≥2
7	≥4	≥4
8	≥6	≥6
9	≥9	≥9
10	≥12	≥12
11	≥15	≥15
12	≥18	≥18
13	≥18	≥21
14	≥18	≥24
15	≥18	≥24
16	≥18	≥24
17	≥18	≥24
17+	≥18	≥24

*As there are no nonbinary standards, nonbinary students may compare their scores to this chart to assess their performance.

Curl-Up

Students are to complete as many Curl-Ups as they are able (up to a maximum of 75) at a specified pace of about one Curl-Up every three seconds. The pace should be called or played on a prerecorded tape or CD.

On a mat, students lie on their back with their knees bent at a 140° angle, feet flat on the mat, and their hands at their sides, palms down. Moving slowly, students curl up, sliding their fingers across a measuring strip on the mat, and then curl back down until their head touches the mat. Students

are directed to stop either after reaching a count of 75 Curl-Ups, when the second form break occurs, or at four minutes time. Table 16, below, presents the data collection requirements for the Curl-Up.



Administration Tips for the Curl-Up Test



- Allow students to learn and practice the correct Curl-Up form.
- Curl-Up movements should be rhythmic (i.e., with the cadence) and continuous. Pauses and rest periods are not allowed.
- Students should reposition themselves if their body moves and their head does not contact the mat at the appropriate spot or the measuring strip moves out of position.

Table 16. Curl-Up: Data Collection Requirements

Data	Gender	Age	Curl-Ups (# completed)
Acceptable values	M, F, N	Age requires the student's date of birth and PFT start date. Age will be calculated automatically by the system as the student's age on the first day of testing.	1–75

Additional scoring rules for the Curl-Up

- In the proper administration of the Curl-Up, a student is allowed two form breaks, with the first form break counting as a repetition. A student who commits two form breaks after the start of the Curl-Up should be scored as having completed one repetition.

Trunk Extensor Strength and Flexibility

One test option is provided under the Trunk Extensor Strength and Flexibility test area—the Trunk Lift.

The Trunk Extensor Strength and Flexibility test area is an important component of fitness because it predicts first-time and recurrent lower back pain—a major source of disability and discomfort in the United States. Although risks of developing back pain are greater with age, awareness and attention to trunk musculature at an early age are important to reduce future risks. Table 17, below, presents the Healthy Fitness Zones for the Trunk Extensor Strength and Flexibility fitness areas.

Table 17. Healthy Fitness Zones for Trunk Extensor Strength and Flexibility*

Age	Females Trunk Lift # of inches HFZ	Males Trunk Lift # of inches HFZ
5	6 – 12	6 – 12
6	6 – 12	6 – 12
7	6 – 12	6 – 12
8	6 – 12	6 – 12
9	6 – 12	6 – 12
10	9 – 12	9 – 12
11	9 – 12	9 – 12
12	9 – 12	9 – 12
13	9 – 12	9 – 12
14	9 – 12	9 – 12
15	9 – 12	9 – 12
16	9 – 12	9 – 12
17	9 – 12	9 – 12
17+	9 – 12	9 – 12

*As there are no nonbinary standards, nonbinary students may compare their scores to this chart to assess their performance

Trunk Lift

While lying face down on a flat surface, students are asked to slowly lift their upper body off the floor, using the muscles of the back, to a maximum of 12 inches. Students need to hold the position for measurement (i.e., distance from the floor to the student's chin), which is recorded in whole inches only. During the test, students should be instructed to keep their eyes focused on a spot on the floor. Once the measurement is made, the student returns to the starting position. A second trial is conducted, and the highest score is recorded. Table 18 below presents the data collection requirements for the Trunk Lift.



Administration Tips for the Trunk Lift Test



- Students should not bounce during the test.
- Providing a spot on the floor for the student to focus on should assist the students in maintaining the proper head position.
- As a safety precaution, students should not be encouraged to lift higher than 12 inches; this is because excessive arching of the back may cause harm by compressing the intervertebral discs.

Table 18. Trunk Lift: Data Collection Requirements

Data	Gender	Age	Trunk Lift (# of inches)
Acceptable values	M, F, N	Age requires the student's date of birth and PFT start date. Age will be calculated automatically by the system as the student's age on the first day of testing.	0–12

Additional scoring rule for the Curl-Up: Values higher than 12 are not permitted in the system and will be flagged as an error.

Upper Body Strength and Endurance

The Upper Body Strength and Endurance fitness area is important in that it contributes to the maintenance of functional health and good posture.

Three test options are provided under this test area:

- Push-Up
- Modified Pull-Up
- Flexed-Arm Hang

Table 19, below, presents the Healthy Fitness Zones for the Upper Body Strength and Endurance fitness area.

Table 19. Healthy Fitness Zones for Upper Body Strength and Endurance*

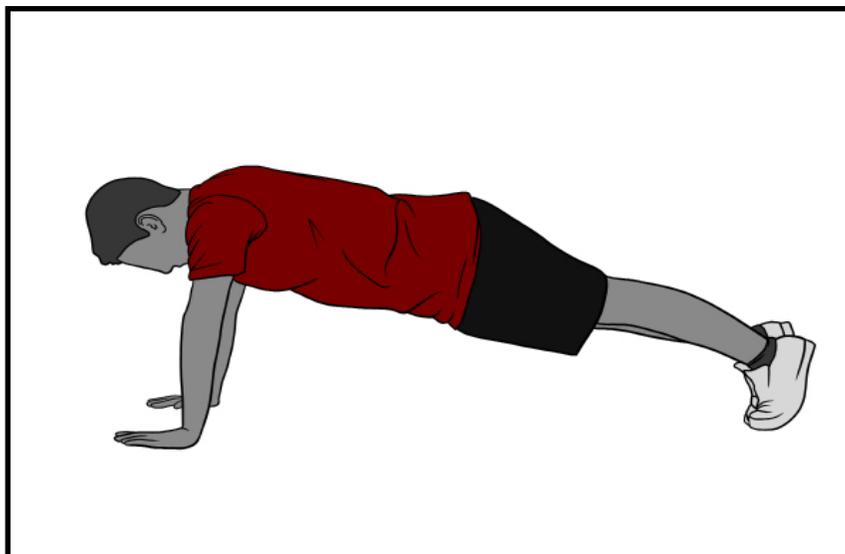
Age	Females Push-Up # completed HFZ	Males Push-Up # completed HFZ	Females Modified Pull- Up # completed HFZ	Males Modified Pull- Up # completed HFZ	Females Flexed-Arm Hang # of seconds HFZ	Males Flexed-Arm Hang # of seconds HFZ
5	≥ 3	≥ 3	≥ 2	≥ 2	≥ 2	≥ 2
6	≥ 3	≥ 3	≥ 2	≥ 2	≥ 2	≥ 2
7	≥ 4	≥ 4	≥ 3	≥ 3	≥ 3	≥ 3
8	≥ 5	≥ 5	≥ 4	≥ 4	≥ 3	≥ 3
9	≥ 6	≥ 6	≥ 4	≥ 5	≥ 4	≥ 4
10	≥ 7	≥ 7	≥ 4	≥ 5	≥ 4	≥ 4
11	≥ 7	≥ 8	≥ 4	≥ 6	≥ 6	≥ 6
12	≥ 7	≥ 10	≥ 4	≥ 7	≥ 7	≥ 10
13	≥ 7	≥ 12	≥ 4	≥ 8	≥ 8	≥ 12
14	≥ 7	≥ 14	≥ 4	≥ 9	≥ 8	≥ 15
15	≥ 7	≥ 16	≥ 4	≥ 10	≥ 8	≥ 15
16	≥ 7	≥ 18	≥ 4	≥ 12	≥ 8	≥ 15
17	≥ 7	≥ 18	≥ 4	≥ 14	≥ 8	≥ 15
17+	≥ 7	≥ 18	≥ 4	≥ 14	≥ 8	≥ 15

*As there are no nonbinary standards, nonbinary students may compare their scores to this chart to assess their performance.

Push-Up

Students are instructed to complete as many 90° Push-Ups as possible at a specified pace (of about one push-up every three seconds), up to a maximum of 75. The pace should be called or played on a prerecorded CD.

Students are directed to stop either after reaching a count of 75 Push-Ups, when the second form break occurs, at four minutes' time, or when they experience extreme discomfort. Table 20 presents the data collection requirements for the Push-Up fitness area.



Administration Tips for the Push-Up Test

- Allow students to learn and practice the correct Push-Up form.
- All genders follow the same protocol.

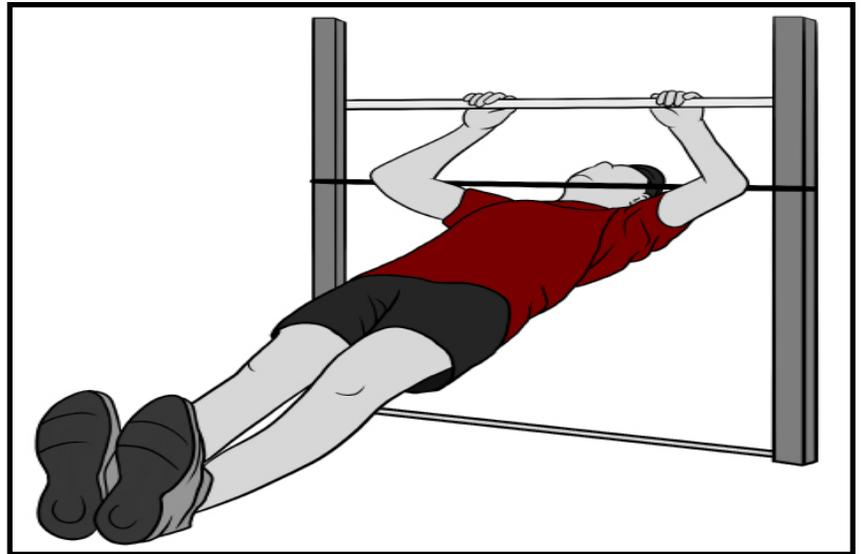
Table 20. Push-Up: Data Collection Requirements

Data	Gender	Age	Push-Up (# completed)
Acceptable values	M, F, N	Age requires the student's date of birth and PFT start date. Age will be calculated automatically by the system as the student's age on the first day of testing.	1–75

Additional scoring rule for the Push-Up: In the proper administration of the Push-Up, a student is allowed two form breaks, with the first form break counting as a repetition. A student who commits two form breaks after the start of the Push-Up should be scored as having completed one Push-Up.

Modified Pull-Up

Students are instructed to successfully complete as many Modified Pull-Ups as they are able. Students perform the Modified Pull-Up by lying on their back directly under a bar. Students grasp the bar and pull up their upper body until their chin reaches a specified level, marked by an elastic band. Students are directed to stop when the second form break occurs. The number of Modified Pull-Ups is recorded. Table 21 presents the data collection requirements for the Modified Pull-Up fitness area.



Administration Tips for the Modified Pull-Up Test



- Only arm movement is allowed; the body should be kept straight.
- Movement should be rhythmic and continuous.
- Students may not stop to rest.

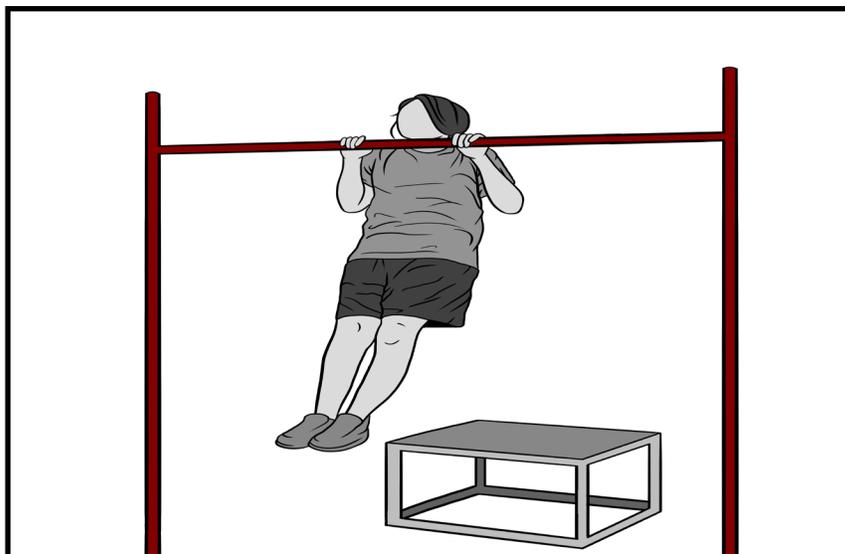
Table 21. Modified Pull-Up: Data Collection Requirements

Data	Gender	Age	Modified Pull-Up (# completed)
Acceptable values	M, F, N	Age requires the student's date of birth and PFT start date. Age will be calculated automatically by the system as the student's age on the first day of testing.	1–75

Additional scoring rule for the Modified Pull-Up: In the proper administration of the Modified Pull-Up, a student is allowed two form breaks, with the first form break counting as a repetition. A student who commits two form breaks after the start of the Modified Pull-Up should be scored as having completed one Modified Pull-Up.

Flexed-Arm Hang

For the Flexed-Arm Hang, students are instructed to hang with their chin above a bar as long as they are able, grasping the bar with an overhand grip or palms facing away from the body. Students are stopped when their chin drops below the bar or when a form break occurs. Table 22 presents the data collection requirements for the Flexed-Arm Hang fitness area.



Administration Tips for the Flexed-Arm Hang Test



- The body should not swing during the test.
- Only one trial is permitted unless the examiner believes that the student has not had a fair opportunity to perform one trial.

Table 22. Flexed-Arm Hang: Data collection requirements

Data	Gender	Age	Flexed-Arm Hang (# of seconds)
Acceptable values	M, F, N	Age requires the student's date of birth and PFT start date. Age will be calculated automatically by the system as the student's age on the first day of testing.	0–75

Flexibility

Flexibility—of the joints, both in the upper and lower body—is an important test area and component of health-related fitness. People benefit from increased flexibility on a daily basis, both in routine tasks and those associated with more rigorous physical activity.

Two test options are provided under the Flexibility test area:

- Back-Saver Sit and Reach
- Shoulder Stretch

Table 23 presents the data collection requirements for the Flexibility fitness area.

Table 23. Healthy Fitness Zones for Flexibility*

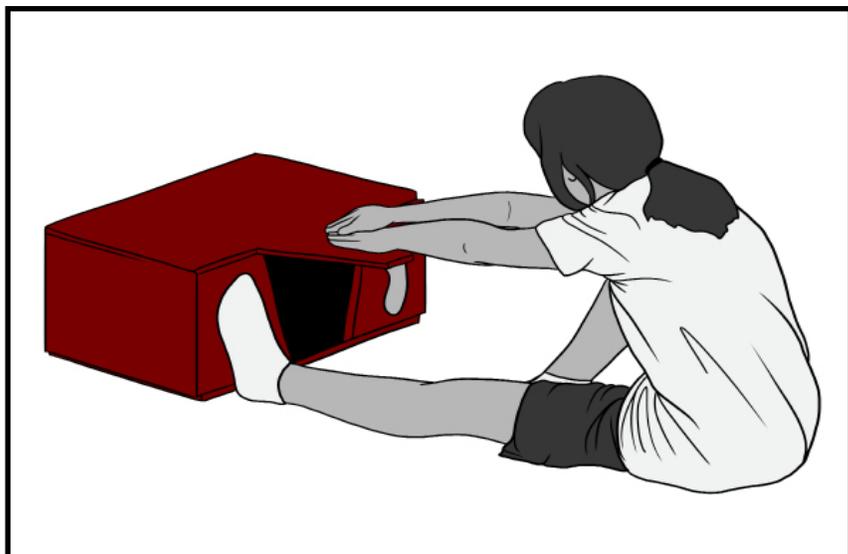
Age	Females Back Saver Sit & Reach # of inches HFZ	Males Back Saver Sit & Reach # of inches HFZ	Females Shoulder Stretch HFZ	Males Shoulder Stretch HFZ
5	9	8	Y**	Y**
6	9	8	Y**	Y**
7	9	8	Y**	Y**
8	9	8	Y**	Y**
9	9	8	Y**	Y**
10	9	8	Y**	Y**
11	10	8	Y**	Y**
12	10	8	Y**	Y**
13	10	8	Y**	Y**
14	10	8	Y**	Y**
15	12	8	Y**	Y**
16	12	8	Y**	Y**
17	12	8	Y**	Y**
17+	12	8	Y**	Y**

* As there are no nonbinary standards, nonbinary students may compare their scores to this chart to assess their performance.

** Touching the fingertips together behind the back on both the right and left sides.

Back-Saver Sit and Reach

The Back-Saver Sit and Reach predominantly measures the flexibility of the hamstring muscles. Students are instructed to reach the specified distance on the left and right sides of the body. Starting in a sitting position, with the left leg extended (the foot is flat against the front side of the box needed for this test) and the right leg bent, the student reaches forward with both hands along the scale printed on the box.



Students reach four times and hold the position on the fourth reach for at least one second. The distance of the reach is recorded to the nearest inch and to a maximum of 12 inches. To measure reach distance with the other side of the body, the same procedure is repeated, with the extended and bent legs switched. The scores are recorded separately for the two sides of the body. Table 24 presents the data collection requirements for the Back-Saver Sit and Reach fitness area.



Administration Tips for the Back-Saver Sit and Reach Test

- The knee of the extended leg should remain straight.
- Hips must remain square to the box. Do not allow the student to turn the hip away from the box as the student reaches.

Table 24. Back-Saver Sit and Reach: Data Collection Requirements

Data	Gender	Age	Left Side (# of inches)	Right Side (# of inches)
Acceptable values	M, F, N	Age requires the student's date of birth and PFT start date. Age will be calculated automatically by the system as the student's age on the first day of testing.	0–12	0–12

Additional Scoring Rules for the Modified Pull-Up:

- To be in the HFZ for the Back-Saver Sit and Reach, the student should meet the reach criteria using both the left and right sides of the body.
- Values higher than 12 are not permitted in the system and will be flagged as an error.

Shoulder Stretch

The Shoulder Stretch measures upper body flexibility. Students are instructed to touch the fingertips together behind the back with one hand reaching over the shoulder and the other under the elbow. Table 25 presents the data collection requirements for the Shoulder Stretch fitness area.



Table 25. Shoulder Stretch: Data Collection Requirements

Data	Gender	Age	Left Side	Right Side
Acceptable values	M, F, N	Age requires the student's date of birth and PFT start date. Age will be calculated automatically by the system as the student's age on the first day of testing.	Y or N	Y or N

Additional scoring rule for the Shoulder Stretch: Both shoulders are tested, and the score for each is recorded separately.