



Muscular Strength and Endurance

What?

Muscular strength is the ability of skeletal muscle to produce measurable force, torque or movement about a single (or multiple) joints, typically during a single, maximal voluntary contraction and under a defined set of controlled conditions.

Muscular endurance is the ability of a muscle or muscle group to perform repeated contractions against a constant external load for an extended period of time.

So What?

Muscular strength and endurance have been linked to low back health, overall mobility and greater independence. There is also some evidence that links skeletal muscle to glucose (or blood sugar) regulation, fat metabolism and bone and joint health.

Now What?

The FitnessGram® testing protocols allow for measurement of muscular strength and endurance simultaneously. There are five testing protocols that can be used to measure muscular strength and endurance: 90 degree push-up, modified push-up, flexed arm hang, and curl-up. The trunk lift can be used to measure trunk extensor strength and flexibility.

The FitnessGram® Scientific Advisory Board recommends that you include one test for the upper body and one for the abdominal region. Like tests of flexibility, conducting the trunk lift can emphasize the importance of activities that influence trunk strength and maintenance of a healthy back.

See pages 2-4 for an overview of the protocols for the curl-up, 90-degree push-up, and trunk lift along with safety considerations, scoring, and tips for success.

Curl-Up

What does it measure? Abdominal strength and endurance

Why is it important? Promotes good posture and low back health.

How is it done?

1. Using a mat, lie on back with knees bent, feet flat, and head touching mat. Feet should extend as far as possible from the buttocks while still maintaining contact with the floor.
2. Arms are straight, hands flat with fingers stretched out and touching the closest edge of measuring strip.
3. On the up command of the cadence, curl-up and slide fingers completely across the strip keeping heels on the mat.
4. On the down command of the cadence, return to start position with head touching mat.
5. Continue assessment until second correction or complete 75 Curl-Ups.

Safety considerations:

1. Stop students at 75 Curl-Ups.

Scoring: The score is the number of Curl-Ups performed. Curl-Ups should be counted when the student's head returns to the mat or paper. Rule of 2: First miss counts. Second miss ends assessment and does not count.

Tips for success:

1. Extend feet as far as possible from the buttocks while still maintaining contact with the floor. The closer feet are to the buttocks the more difficult the curl up.
2. Pull on students hands to ensure shoulders are relaxed and in proper position.
3. Use the cadence to encourage a steady, continuous movement. Watch for correct form.
4. Instead of using the curling strips, create a tape line the width of the curling strip on one side of a mat. Then have students reach to the end of the mat. For some this is easier to feel.

Curl-up one-pager provided as a public service by HealthMPowers (www.HealthMPowers.org)

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90° Push-Up

What does it measure? Upper body strength and endurance

Why is it important? Important for daily living and promoting good posture.

How is it done?

1. Lie face down with hands under or slightly wider than shoulders.
2. Straighten legs and back with toes tucked under.
3. Push up off the mat with arms until arms are straight.
4. Lower body until elbows bend at 90 degrees.
5. Continue to rhythm of cadence. Assessment ends at second correction.

Safety considerations: Be sure arms do not bend past 90 degrees.

Scoring: The score is the number of 90 degree push-ups performed. First miss counts; second miss ends assessment. A score of zero can't be given.

Tips for success:

You may use a nerf ball or other piece of pliable equipment that can be placed under the student's chest to help them know what a 90 degree bend in the arms feels like.

It may be helpful to make a recording with a voiceover that counts the number of 90° push-ups for the students (record the teacher counting over the cadence CD).

For students having difficulty performing the push up, encourage the student to practice holding plank position.

- In plank position, students can roll balls back and forth with a partner.
- In plank position, alternate the weight on hands by picking up a bean bag with one hand and placing it on a milk crate in front of them and then using the other hand to take it down. Repeat.

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Trunk Lift

What does it measure? Lower back and abdominal strength and flexibility

Why is it important? Allows you to participate in a wide range of physical activities. Helps maintain good posture and low back health.

How is it done?

1. Lie on the mat facedown, toes pointed.
2. Place hands under thighs
3. Place a coin or other marker on the floor in line with student's eyes. During movement, eye focus should not move from this marker.
4. Lift upper body off the floor in a very slow and controlled manner to a maximum height of 12 inches, keeping head in a straight alignment with spine.
5. Hold this position long enough to allow tester to measure.
6. Return to starting position in a controlled manner.
7. Repeat and record highest of 2 scores.

Safety considerations:

1. Use a yardstick or 15 inch ruler for measurement.
2. Hold the ruler at least one inch in front of the chin for measurement.
3. Do not allow students to do ballistic, bouncing movements.
4. Do not allow students to reach beyond 12 inches. Excessive arching of back may compress spinal discs.

Scoring:

1. Record the score in inches (round up or down to the closest whole inch). Distances above 12 inches should be recorded as 12 inches.

Tips for success:

1. Maintaining focus on the marker should assist in maintaining the head in a neutral position.
2. The tester or measurer should make the reading at eye level and, therefore, should assume a squat or lying down position.
3. For easier reading, mark the ruler with colored tape at 6", 9", and 12".

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