



BMI SCREENING PROGRAM: HEIGHT & WEIGHT MEASUREMENT TRAINING MANUAL

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General Information & Requirements

INTRODUCTION

To improve the health of Arkansas children and combat the growing epidemic of child and adolescent obesity, in 2003 the Arkansas General Assembly and Gov. Mike Huckabee passed Act 1220. This multi-pronged initiative was the first of its kind in the nation. One component of Act 1220 mandates annually measuring the height and weight of each public school student to determine their body mass index (BMI) for age percentile. Act 201 of 2007 modified the requirements so that only students in grades K, 2, 4, 6, 8, and 10 are required to be assessed every school year. Schools have the option, however, of measuring all students. Height, weight, age, and gender are used to calculate BMI percentile for age. A BMI is a screening test only; it indicates if a person is underweight, at a healthy weight, overweight, or obese.

To help the state and schools provide parents with important knowledge regarding the health of their children, the Arkansas Center for Health Improvement (ACHI) became the administrator responsible for developing and implementing standardized statewide BMI assessments and reporting beginning with academic year 2003–2004. ACHI has continued assisting schools for the past 15 years. ACHI is committed to improving the assessment process, making it easier for schools to participate in this important statewide initiative to improve the health of our children.

BMI MEASUREMENT TRAINING AND REPORTING

Act 201 of 2007 requires Arkansas Department of Health Community Health Nurse Specialists (CHNS) to work with schools to assure that BMI for age assessment protocols are followed by school employees or their designees who conduct the BMI assessments and other student health screenings. Training sessions for school personnel are provided annually.

Act 1220 and Act 201 also require that BMI results be reported each year to parents or guardians, along with an explanation of what the BMI means, the health risks associated with obesity, and the effects of nutrition and physical activity. If a parent refuses to have their child's BMI assessed and reported, they must provide a written refusal to the school.

Questions and technical assistance requests should be directed to the Community Health Nurse Specialists (CHNS) and Community Health Promotion Specialists (CHPS) located at the Arkansas Education Service Cooperatives, the State School Nurse Consultant and Act 1220 Coordinator at the Arkansas Department of Education (ADE) 501-683-3604, the Arkansas Department of Health (ADH) Act 1220 Coordinator 501-280-4889, or ACHI 501-526-2244.



Learning Objectives

The goal of this protocol for Body Mass Index (BMI) assessment for age is to certify participants in the measurement techniques described in this manual.

At the completion of this training, the participant will be able to:

1. Set up measurement stations with all of the appropriate equipment.
2. Check the accuracy of the scales.
3. Prepare students for measurement.
4. Measure height and weight following proper procedure.
5. Perform the steps of the weight measurement correctly.
6. Perform the steps of the height measurement correctly.
7. Apply the one-inch rule for height.
8. Prepare students' data for entry into the web-entry system.
9. Maintain students' privacy and confidentiality.
10. Make available a confidential student health report to parents/guardians.



Definitions

BMI – Body Mass Index.

BMI =	$\frac{\text{(Weight in Pounds)}}{[\text{(Height in Inches x Height in Inches)}]}$	x 703
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BMI FOR AGE ASSESSMENT PROTOCOLS – A detailed plan designed to describe appropriate procedures for assessment.

BMI FOR AGE ASSESSMENT – Calculating the height and weight, as in the definition for BMI, and applying the CDC growth charts for age and gender.

BMI PERCENTILE FOR AGE – An indicator to assess the size and growth patterns of individual children based on the Centers for Disease Control and Prevention’s (CDC) BMI-for-age growth charts for boys and girls.

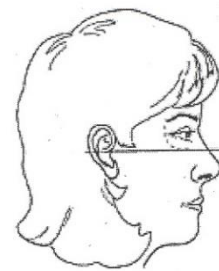
CARPENTER’S SQUARE – An instrument for ensuring a level reading of height.

CERTIFICATE OF COMPLETION – Document provided upon completion of BMI assessment training protocol.

CONFIDENTIAL – Information marked or intended for a specific person or persons.

DIGITAL SCALE – An instrument for measuring weight.

EXTERNAL AUDITORY CANAL – Passageway that leads from the outside of the head to the tympanic membrane, or eardrum membrane, of each ear.



FRANKFORT HORIZONTAL PLAN – Imaginary line passing through the external ear canal and across the top of the lower bone of the eye socket, immediately under the eye.

HEIGHT – A standing measurement in inches or meters.

MEDIAL BORDER – Relating to the middle or center.

ORBITAL MARGIN – The top of the lower bone of the eye socket.

PRIVATE – Not open or in public.

RECORDER – Person who writes down student heights and weights or enters measurements into database.

SCAPULAE – Two large, flat, triangular bones forming the back part of the shoulder; also called shoulder blade.

STADIOMETER – Instrument for measuring standing height.

STUDENT HEALTH REPORT – A written notice to parents with student’s health screening information.

WRITTEN REFUSAL – A document addressed to the school district requesting that a child not be included in assessing BMI, provided by the parent or guardian.

WEIGHT – A measurement in pounds.



Recommended Equipment

The equipment listed below is recommended for the accurate measurement of height and weight in Arkansas public and charter schools. The recommended equipment was tested in pilot schools across Arkansas and was shown to be accurate and reliable.

1. STADIOMETERS AND SCALES

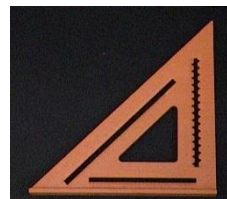
Height will be measured using a stadiometer. Stadiometers can be either portable or permanently affixed to a wall. In general, it is recommended that portable stadiometers are used, so that schools can share equipment, and to avoid problems related to improper installation of wall-mounted models. It is also recommended that digital scales be used over other models due to better precision of the measurements, and ease of reading the digital read-out.

RECOMMENDED STADIOMETERS AND SCALES:*

STADIOMETERS

a. 84" Yard Stick on Wood Board

Originally the Department of Corrections mounted an 84" metal yardstick onto an 86" wood board (at right). To build your own stadiometer to the Department of Education's specifications, see Appendix A. Taping the wood board to the wall with some type of strong adhesive tape (e.g., duct tape) is suggested for stability of the stadiometer. A carpenter's triangle is used for the headpiece. This arrangement allows that unit to be portable, as recommended. As a result of testing numerous plastic stadiometers in a similar price range, it was found that most of those models were not durable, especially the thin plastic headpieces. Therefore, in order to keep costs within a reasonable range, the board-mounted metal yard stick with a hard plastic carpenter's triangle headpiece was tested and found to work quite well.



b. Shorr Board

The Shorr Measuring Board Stadiometer (at left) is top-of-the-line, Gold Standard equipment commonly used in research settings. It offers accurate measurement due to the wide wooden head piece used for measuring height, thereby reducing the chances for measurement error commonly caused when a narrower head piece is used. The Shorr Board is sturdy and durable as it is handcrafted out of solid wood. It is also collapsible which allows it to be stowed away or transported easily.



SCALES

a. **Tanita HD-314 Scale**

The Tanita HD-314 scale is a portable scale originally designed for home use but is capable of withstanding heavy-duty use. It measures up to 330 pounds, is lightweight for good portability, and has a digital read-out.



b. **Tanita HD-351 Scale**

The Tanita HD-351 scale is a portable scale originally designed for home use, as well, but is capable of withstanding heavy-duty use. It measures up to 440 pounds, is lightweight for good portability, and has a digital read-out. If using this scale, it is recommended that a piece of colored tape be placed over the previous weight readout for confidentiality purposes.



2. **STEP STOOL**

It is recommended that each school purchase a two-height step stool for use with the height measurements. The accurate measurement of height requires that the measurer is able to read the measurement line at eye-level. Additionally, some measurers will not be tall enough to do this without standing on a step stool, even for elementary school children.

3. **BATTERIES**

Many scales require batteries. Usually AA batteries or lithium batteries are required, but you will need to check the type and number of batteries required for the scales used at your school.

4. **STANDARD WEIGHTS FOR CHECKING ACCURACY**

At the beginning of each measurement day at the school, accuracy of the scales will be required. A known standardized weight must be placed on each scale. This weight (the reading on the scale) should be logged in the calibration log with the corresponding date and time noted. If the recorded weight is more than half a pound higher or lower than the standard weight, the measurement should be repeated and re-recorded. If the recorded weight is more than half a pound different from the calibration weight, then you should change the batteries. If that does not correct the problem, then this scale should not be used for assessments.

5. **DATA COLLECTION**

There are two methods for data collection. They are:

- Direct data entry via web (recommended).
- Data entry on paper forms to be entered on the website at a later time.



6. NAME TAGS

The use of nametags for the students who are being measured is recommended. This helps to ensure that the correct data collection is completed for the corresponding student. It is also recommended that nametags are used for all staff members involved in the collection of these data. This will identify the measurement team to the student and to the school staff.

7. ADHESIVE TAPE

Duct tape, or a similar adhesive (such as blue painter's tape) is recommended to stabilize the wood-board mounted stadiometers to the wall if the 84" yard stick or similar stadiometer is used.

8. OFFICE SUPPLIES

The following general office supplies are recommended when performing the height and weight measurements in schools:

- Baskets for children's personal items
- Black pens (if not doing direct data entry)
- Extra blank nametags
- Paper clips

* *Contact your Community Health Nurse Specialist or Community Health Promotion Specialist at your local education cooperative for purchasing information or other equipment options.*



Standardized Measurement Procedure

It is recommended that multiple stations be used, each consisting of one complete set of data collection equipment: one stadiometer (stabilized against the wall with duct tape if necessary), one scale (tested for accuracy), one step stool, data collection forms or a computer, basket (for the child's personal items), and general office supplies. In order for an individual school to utilize multiple stations, several schools will need to share equipment and rotate that equipment from one school to the next. For the most accurate measurements, it is highly recommended that assessments be conducted on hard surface floors (e.g., gym floor, tile floors). Avoid carpeted floors.

1. PREPARATION OF THE CHILD

The child should be asked to remove as much outerwear as possible. Regardless of the clothing worn, the child should be asked to remove his/her shoes and will be measured either barefoot or while wearing socks.

Additionally, the child should be asked to empty his/her pockets and remove all jewelry or other objects. The child should be asked to remove eyeglasses, hair barrettes, and ties or rubber bands, if possible, so that accurate height and weight measurements can be obtained. A small box or basket should be provided at each measurement station for the child to place their personal items in until measurements are complete.

2. MEASUREMENT ORDER

One measurement of weight and two measurements of height should be taken for each child. Because the measurement of height requires greater skill to perform correctly, two measurements are required in order to reduce errors and therefore obtain a more accurate calculation of BMI. If the difference between the two height measurements is greater than one inch, then a second set of two height measurements should be taken to try to obtain values within one inch of each other. Use the second height measurement for data entry, unless both measurements differ by more than one inch.

The measurements of weight and height should be measured in rotational order, as follows: first height, weight, and second height. If the difference between the two height measurements is greater than one inch (per above), then the child must be re-measured. If after two trials a pair of height measurements within the one-inch criteria cannot be achieved, then the child's assessment is considered "Unable to be Assessed." When entering this child's data into the web-entry system, enter "HT" (inaccurate height measurement) into the Notes Field.

It is recommended that a team of two people perform the measurements together at each measurement station. One person should be designated as the measurer and the other person should be designated as the recorder. The measurer performs the weight and height measurements on the child, and the recorder either records the data on the assessment form or directly enters the child's information into the web-entry system.



3. ROLE OF THE RECORDER

The measurer should take the first height measurement and call out the number to the recorder. The recorder should call the number back to the measurer to confirm the reading. Then the recorder should record that number on the data collection form.

Next, the measurer should position the child for the weight measurement and verbally indicate to the recorder that the child is ready. The recorder should then obtain the number for the weight measurement from the read-out on the scale and record that number on the data collection form or directly into the web-entry system in the space indicated for “Weight.”

The measurer should then re-measure the child’s height, and the recorder should record the second height number in the space indicated for “Height” using the same steps as used for the first height measurement.

NOTE: The reading for the weight measurement should NOT be called out by either the measurer or the recorder to ensure that the child (and other staff or children who may be standing nearby) is not made aware of his/her weight measurement.

Since the height measurement is subject to greater error, and is not generally considered to be sensitive data, those measurement readings should be called out by the measurer and the recorder to increase the overall accuracy of height measurements.

The recorder is responsible for checking the two height measurements to determine if there is more than a one-inch difference between the two heights. If there is more than a one-inch difference, then the child must be re-measured as described in the “Standardized Measurement Order” section. If a re-measurement needs to be made, the recorder should place a single line through the entries for the first set of measurements, and initial the line if using the assessment form. Then the second set of two measurements is recorded on the lines provided. If using the web-entry system, simply replace the height measurement with the new second height measurement in the indicated fields. Whether or not the one-inch criteria are achieved with the second set of two measurements, no additional height measurements will be taken.

4. WEIGHT MEASUREMENT

For the measurement of weight, the child will be asked to step up backward onto the scale and stand still over the center of the scale with body weight evenly distributed between both feet. In order to ensure confidentiality and to prevent the child from seeing his/her weight, it is required that the child step on the scale backward facing away from the readout. The child’s arms should be hanging freely by the sides of the body, with palms facing the thighs. The child should hold his/her head up, and face forward.

Weight should be recorded to the nearest two-tenths (0.2) of a pound, using the recommended scale with a digital readout. Depending on the type of scale used, record to the nearest fraction of a pound, whole pound, pounds and ounces.



5. HEIGHT MEASUREMENT

For the measurement of standing height, the child should be asked to stand with his/her back against the board. The back, scapulae, and buttocks should be in contact with the vertical board if possible, or whichever part of the body touches the board first. The weight of the child should be evenly distributed between both feet. The child should be asked to place his/her legs together, bringing the ankles or knees together — whichever comes together first (often they will come together simultaneously). The child's feet should be separated so that the medial borders of the knees are in contact, but not overlapping.

The child should be instructed to stand erect (stand up straight and look straight ahead). The child's position should be verified from both the FRONT and from the LEFT side of the body. Next, the child's head should be positioned in the Frankfort Horizontal Plane. In this position, an imaginary line can be drawn from the bottom of the eye socket (orbital margin) to the external opening of the ear (external auditory canal).

The child should be asked to inhale deeply and hold his/her breath WHILE MAINTAINING the head and body in the same position. Sometimes a child will either lift his/her head or pull up onto the toes when taking the deep breath. If this happens, the measurer should re-position the body and head before taking the measurement.

The moveable headpiece should be brought onto the uppermost (superior) point on the head with sufficient pressure to compress the hair. After the measurement is obtained the child should be told they no longer need to hold his/her breath. Record the measurement to the nearest one-eighth ($1/8$) of an inch. The measurement must be converted from fractions to decimals for data entry (see conversion table).



Recording the Data

Whether using the paper assessment forms or inputting the data directly into the web-entry system, the information needed is the same. There are two forms that need to be maintained by the assessors: 1) The Scale Accuracy Log, and 2) The Height and Weight Data Collection Form (or direct web-entry).

ACHI SCALE ACCURACY LOG

This form is required to verify the accuracy of each scale to be used for measurements on the day of the scheduled measurement at each school. The scales should be placed in the exact location where measurements will take place and verified in that location. Once verified, **DO NOT MOVE** the scales.

At the top of the scale accuracy log, fill in the school year, name of the school, school district, and county. Fill in the date of the verification and the initials of the person performing the verification. In the third column, fill in the scale number or model name/number of the scale. In the fourth column, fill in the station number, if more than one station will be used at a school on the same day.

In the next three columns, fill in the weight readings obtained from the verification weights. Three known weights of increasing heaviness are used; however, the use of one known weight is sufficient if time and/or cost are an issue. To minimize the misreporting of a child's BMI due to faulty equipment, **verification with at least one known weight is extremely important.**

For each known weight used, the verification steps are as follows:

- a. Turn the scale on to "zero" the scale.
- b. Place a known weight in the center of the scale. If using more than one known weight, place the smallest one on the scale first.
- c. Record the scale reading in the appropriate column (e.g., if using a 5-pound known weight, record the scale readout in the 5-pound column) for the known weight used. If using more than one weight, repeat the steps until all of the known weights have been used.

If the recorded scale reading is more than half a pound (English measure) higher or lower than the known weight, the measurement should be repeated and re-recorded (on the next line of the form). If the scale reading remains more than half a pound different from the known weight, then that scale should not be used for measurements that day.



HEIGHT AND WEIGHT DATA ENTRY

Two methods of recording height and weight are acceptable. The same information is needed regardless of the method chosen.

The two methods are:

1. Record height and weight on the Height and Weight Data Collection form and then enter the information into the web-entry system.
2. Directly enter the height and weight into the web-entry system at the time of the assessment.

To create the student health report that is sent home to the parent/guardian, the assessment date is needed to calculate the BMI.

Finally, the child's weight and second height measurements should be entered into the web-entry system in the "notes" field. If the child is unable to be assessed, enter the two-letter code for the appropriate reason, as follows:

- AB — Absent
- CR — Child Refused
- PR — Parent Refused
- PT — Pregnancy
- PD — Physically Disabled
- HT — Second Measurement Not Within 1 Inch
- WT — Weight Exceeded Scale
- OT — Other (Explain)

NOTE: For full compliance all "Unable to be Assessed" information must be entered into the web-entry system in the "notes" field.

Arkansas law allows parents the option to refuse weight and height measurements. If the parent wishes for their child not to participate, they must provide a written refusal to the school.



Summary of Measurement Procedure

- Set up measurement stations with the appropriate equipment.
 - Computer with internet access (if available)
 - Digital scale
 - Stadiometer, stabilized against the wall
 - Step stool
 - Basket and general office supplies
- Verify accuracy of the scales.
- Prepare the child for measurements.
 - Name tag
 - Remove outerwear, shoes, glasses, jewelry
 - Empty pockets
- Measure first height, weight, and second height.
 - Measurer positions the child and performs the measurements in rotational order
 - Recorder verifies data entry (either paper record or web entry), then checks height measurements for one-inch criteria
- Apply the one-inch criteria for height; re-measure height if necessary.



Summary of Weight Measurement

- Turn on the scale to “zero” the scale.
- Place standard weight on the scale to ensure accuracy of the scale.
- If the readout is more than one-half pound off the standard weight, change the batteries. Then place the standard weight on the scale again. If it is still off by more than a half a pound, do not use this scale.
- If scale is accurate, begin assessments.
- Ask the child to remove extra layers of clothing, jewelry, and any items in his/her pockets.
- Ask the child to step on the scale backward (for confidentiality).
- Ensure that the body weight is evenly distributed between both feet.
- Ensure that arms hang freely by the sides of the body, palms toward thighs.
- Ensure that head is up and facing straight ahead.
- Record weight to the nearest 0.2 pounds (or appropriate unit for the scale).



Summary of Height Measurement

- Child stands with back against the board (or whatever part of the body touches the board first; may be more than one body part).
- Body weight is evenly distributed between both feet.
- Arms hang freely by the sides of the body, palms facing the thighs.
- Legs are placed together, bringing knees or ankles together.
- Child stands erect; head is up and facing straight ahead.
- Verify body position front and left.
- Position head in Frankfort Horizontal Plane.
- Child inhales deeply holding his/her breath WITHOUT moving head or body.
- Bring headpiece down onto the upper most point on the head; compress the hair.
- Child is told to let breath out.
- Height is recorded to the nearest 1/8th inch (or appropriate unit for the stadiometer).
- Repeat after obtaining weight.



Resources

ARKANSAS-SPECIFIC WEBSITES

Arkansas 21st Century Network

<https://medicine.yale.edu/childstudy/zipper/21c/projects/arkansas/>

Arkansas Center for Health Improvement

<http://www.achi.net>

Arkansas Child Health Advisory Committee

<https://www.healthy.arkansas.gov/programs-services/topics/child-health-advisory-committee>

Arkansas Coordinated School Health

<http://www.arkansased.gov/divisions/learning-services/school-health-services/arkansas-coordinated-school-health>

Arkansas Department of Education – Child Nutrition Unit

<http://www.arkansased.gov/divisions/child-nutrition-unit>

Arkansas Department of Education – School Health Services

<http://www.arkansased.gov/divisions/learning-services/school-health-services/>

Arkansas Department of Health

<https://www.healthy.arkansas.gov/>

Arkansas Economic Development Institute – Census State Data Center

<https://ualr.edu/aedi/census-state-data-center/>

Arkansas Government Act 1220 of 2003

<http://www.arkleg.state.ar.us/assembly/2003/R/Acts/Act1220.pdf>

Arkansas Government Act 29 of 2003

<http://www.arkleg.state.ar.us/assembly/2003/S2/Acts/Act29.pdf>

Arkansas Government Act 201 of 2007

<http://www.arkleg.state.ar.us/assembly/2007/R/Acts/Act201.pdf>

Healthy Active Arkansas

<https://healthyactive.org/>



NATIONAL WEBSITES

General

Action for Healthy Kids

<http://www.actionforhealthykids.org/>

Alliance for a Healthier Generation

<http://healthiergeneration.org/>

National Association of School Nurses

<http://www.nasn.org>

National Heart, Lung, and Blood Institute

Overweight and Obesity <https://www.nhlbi.nih.gov/health-topics/overweight-and-obesity>

Cardiovascular Health https://www.nhlbi.nih.gov/files/docs/peds_guidelines_sum.pdf

Robert Wood Johnson Foundation

<https://www.rwjf.org/en/our-focus-areas/topics/childhood-obesity.html>

The Obesity Society

<https://www.obesity.org/>

The Weight-Control Information Network, National Institutes of Health (NIH)

<https://www.niddk.nih.gov/health-information/communication-programs/win>

Assessment

Annie E. Casey Foundation- Kids Count

<http://www.aecf.org/work/kids-count/>

National Center for Chronic Diseases Prevention Health Promotion Nutrition, Division of Nutrition, Physical Activity, and Obesity

<https://www.cdc.gov/nccdphp/dnpao/index.html>

U.S. Census – American FactFinder

<https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>

Nutrition

Academy of Nutrition and Dietetics

<https://www.eatright.org/for-kids>

BMI Calculator

<https://www.cdc.gov/healthyweight/bmi/calculator.html>

My Plate – USDA

<https://www.choosemyplate.gov/>



Physical Activity

America Walks

<http://americawalks.org/>

Healthy Places by Design

<https://healthyplacesbydesign.org/>

Human Kinetics

<http://www.humankinetics.com/home>

Let's Move!

<https://letsmove.obamawhitehouse.archives.gov/>

National Center for Bicycling and Walking

<http://www.bikewalk.org/>

Physical Activity Guidelines for Americans

<https://health.gov/paguidelines/guidelines/default.aspx>

Safe Routes to School

<https://www.saferoutespartnership.org/> and

<http://www.walkbiketoschool.org/beyond/safe-routes-to-school/>

SHAPE America

<https://www.shapeamerica.org/>

Tools for Schools

Arkansas BMI Toolkit for School Nurses

<https://www.healthy.arkansas.gov/images/uploads/BMIToolkitNurses.pdf>

Health Education Curriculum Analysis Tool – HECAT

<https://www.cdc.gov/healthyyouth/hecat/>

Physical Education Curriculum Analysis Tool – PECAT

<https://www.cdc.gov/healthyschools/pecat/index.htm>

School Health Index

<https://www.cdc.gov/healthyschools/shi/index.htm>

Smart Snacks Calculator

<https://foodplanner.healthiergeneration.org/calculator/>

USDA Team Nutrition

<https://www.fns.usda.gov/tn/team-nutrition>

Wellness School Assessment Tool – WellSAT

<http://www.wellsat.org/>



Tools for Communities

CDC School Health Policies and Practices Study

<https://www.cdc.gov/healthyyouth/data/shpps/index.htm>

State of Obesity Reports

<http://www.stateofobesity.org>

Tools for Kids and Parents

Body and Mind

<https://www.cdc.gov/bam/index.html>

Nemours Foundation: Kids Health

<https://kidshealth.org/en/parents/nemours.html>

Tools for Parents and Providers

2000 CDC Growth Charts

https://www.cdc.gov/growthcharts/cdc_charts.htm

American Academy of Pediatrics Policy Opportunities Tool

<https://ihcw.aap.org/Pages/popot.aspx>

Be Our Voice – National Institute for Children’s Health Quality

Advocacy Toolbox <https://www.nichq.org/resource/advocacy-toolbox>

Advocacy Resource Guide <https://www.nichq.org/resource/advocacy-resource-guide>

Center for Science in the Public Interest

<https://cspinet.org/>

Dietary Guidelines for Americans

<https://health.gov/dietaryguidelines/2015/>

Healthy People 2020 Toolkits

<https://www.healthypeople.gov/2020/tools-resources>



SCALE ACCURACY LOG FOR BMI MEASUREMENT

SCHOOL YEAR: _____

SCHOOL NAME: _____

SCHOOL DISTRICT NAME: _____

COUNTY: _____

Date	Initials	Scale No. or Model	Station No.	5 lb. verification	10 lb. verification	20 lb. verification	Other (_____)

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BMI TASK FORCE

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