KIN 4370: Virtual Exercise Testing and Prescription Lab Manual

KIN 4370: Virtual Exercise Testing and Prescription Lab Manual

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Contents

Introduction

MELISSA MARKOFSKI

This is the laboratory manual for KIN 4370, Exercise Testing and Prescription. It is for use during the weekly lab class meetings. Please read the chapter for each week ahead of attending class. The questions for each chapter are not graded, but will help prepare you for your lab report.

This book is designed to be used electronically, but can also be downloaded as a PDF. Please be aware that there are activities imbedded in the electronic text that will not work in the PDF download. However, if you would like to download the chapters (or print them) for use during class, that is acceptable. It is advisable that in order to maximize the student returns to the electronic version to complete the activities and material not in the PDF.

Exam questions will include questions from the lab–both the protocols and the interpretation of the results. Please remember to study the materials in this manual.

CHAPTER 1

Chapter 1: Foundations of assessment techniques

MELISSA MARKOFSKI

BACKGROUND

TEST VALIDITY VERSUS RELIABILITY

When selecting exercise tests, we want the test to be **valid** and **reliable**. It is possible for tests to be one but not the other. If a test is valid, it measures what we want it to measure. If a test is reliable, the results are consistent and stable.

For example, someone could decide they want to measure relative body fat to estimate people's fitness. They could use an established method to measure relative body fat, repeat the test three times, and produce results of 18.1%, 17.9%, and 18.1%. These results have little variability, and for a measurement like body fat we would consider these to be reliable results—these measures are consistent. In addition, people who are fit generally have lower relative body fat than people who are not fit. Therefore, there is a relationship between relative body fat and fitness.

However, measuring someone's relative body fat does not provide us with information to determine the fitness level of the individual. We all probably know someone who meets exercise recommendations, but has higher relative body fat than someone else who is thin and does not exercise very much. This means the example of using relative body composition is a reliable measurement (the results were consistent and stable), but it is not a valid test to determine fitness. However, it would be a valid (and reliable!) test of body composition—and indeed we do use relative body fat as a measure of body composition.

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RELATIVE VERSUS ABSOLUTE

You probably noticed in the text above the term “relative body fat”, as opposed to the shorter “body fat”. There is a distinction between a measurement that is relative or absolute, and especially in exercise science it can make a difference in interpreting results and prescribing an exercise training plan. When we are using a test or prescription that is in reference to some other physiology this is a relative measurement. In the example above, 18.1% body fat is relative to the whole person (100%). If we know the person’s body weight, we can also express body composition in absolute terms. If the person who is 18.1% had a body weight of 80kg, then they have 14.48kg of body fat. The 14.48kg measure is an absolute term—it is not relative to anything else. In exercise prescription, we frequent use relative load guidelines. For example, prescribing someone to walk on a treadmill at 50% of heart rate maximum.

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CLASS ACTIVITY

ACTIVITY 1: VALIDITY, RELIABILITY, RELATIVE, AND ABSOLUTE

Equipment: Find any two small items that are not typically used for measuring distance (ex: pencil, paper clip, card, glove, etc.)

Participant: One person (yourself or someone you live with) will be measured.

Instructions:

1. Using your items one at a time, measure your arm or your forehead.
2. Use each item to measure the arm or forehead three times.
3. Record your values in absolute or relative terms (you decide which is best).

Virtual Lab Activity 1:

Consider this: Was your unit of measurement reliable? Was it valid? Why or why not? With the general instructions of "measure your arm", do you think someone may measure it differently than you? (for example, the length vs. the width)

ACTIVITY 2: CALIBRATE TREADMILL

Equipment: Treadmill, measuring tape, chalk

1. Measure the length of the entire belt (not just the length on the top of the deck!)
2. Turn the treadmill on a low speed
3. Time how long it takes for the treadmill to complete 10 revolutions
4. Noticeably increase the speed of the treadmill
5. Time how long it takes for the treadmill to complete 10 revolutions at this second speed
6. Calculate the speed of the treadmill (see equation below)
7. Compare the calculated speed with the programmed speed of the treadmill

Video of how to measure the length of a treadmill:
(You only need to watch steps 2-5 (~20 seconds of the video)

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To calculate the speed of the treadmill:

The distance of the TM belt should be IN METERS. Multiply distance in meters*number of revolutions, then divide this number by the time in SECONDS. This will give you the speed in m/s, but the TM is in mph. To covert m/s to mph, multiple your number by 2.23694

(distance in meters * # of revolutions) / time in sec = (TM speed in m/s)

(TM speed in m/s)* (2.23694) = TM speed in mph

Virtual Lab Activity 2:

Practice Calculation: You measured a treadmill belt and found it to be 3.2 meters long. The treadmill took 20 seconds to go 10 revolutions. What speed was the treadmill moving at?

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CHAPTER 2

Chapter 2: Pre-test screening and assessment

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BACKGROUND

PRE-PARTICIPATION SCREENING

Physical exercise places physiological demands on the body, especially the cardiorespiratory and skeletal muscle systems. This increases the chance for an individual to experience an injury or cardiovascular event. In symptom-limited maximal exercise testing, the rate of cardiac event is about six events per 10,000 tests. It is expected that sub-maximal exercise testing would have an even lower event rate.

To minimize this risk, we perform pre-participation screenings. Ideally, these screenings include a health history and physical activity readiness questionnaire. In this course we will use the PAR-Q+ as our self-guided pre-participation screening questionnaire. http://eparmedx.com/wp-content/uploads/2013/03/January2020PARQPlus_Image.pdf

Criteria	Definition	Additional notes
Age	Males: > 44 Females: > 54	
Family history	History of cardiovascular events (myocardial infarction, coronary revascularization, sudden cardiac death)	Risk factor is met when one of these three events occurred before 55 years of age in a male or 65 years of age in a female first degree relative
Tabacco use	Current tobacco user, quit within the last 6 months, or regularly exposed to secondhand smoke	No current criteria for vaping tobacco exposure, but results from recent and on-going research studies supports that vaping tobacco causes changes in endothelial cells consistent with CVD
Physical activity	Sedentary lifestyle	Not participating in 30 mins of moderate exercise at least 3 times per week
Body weight	Obesity BMI >29.9 kg/m^2 or a waist circumference >102 cm in males or >88 cm for females	If person has BMI ≥ 30 and high waist circumference, it counts as one risk factor
Blood pressure	Hypertension SBP >129mmHg and/or DBP >79mmHg	These are the new guidelines! Use these and not the ones in your book (ACSM-EP exam uses these)
Blood lipids	Dyslipidemia: client is taking blood lipid-lowering medication or LDL>129 mg/dL HDL<41 mh/dL	If total cholesterol is the only measure available, use >199 mg/dL as the criteria instead
Glucose metabolism	Diabetes Fasting glucose >125 mg/dL or 2 hr OGTT >199 mg/dL Or HbA1c >6.4%	Test is usually repeated to confirm, or blood glucose and HbA1c are used together to diagnose diabetes
HDL cholesterol (Negative risk factor)	HDL cholesterol >59 mg/dL	Negative risk factor: subtract 1 risk factor from the above positive risk factors

BLOOD PRESSURE MEASURES AND CLASSIFICATIONS

All participants should have their blood pressure measured to help assess risk. Pre-2017 ACSM guidelines recommended blood

glucose and cholesterol screening, but this recommendation was removed from the latest guidelines. Exercise will increase the individual's systolic blood pressure (SBP) while they are exercising. This transient increase in SBP is not of concern. However, if the participant's SBP is high prior to an exercise session the exercise session could increase SBP to an excessively high level.

Blood pressure category	**Systolic BP**		**Diastolic BP**
Normal BP	<120 mmHg	AND	<80 mmHg
Elevated BP	120-129 mmHg	AND	<80 mmHg
Stage 1 hypertension	130-139 mmHg	OR	80-89 mmHg
Stage 2 hypertension	140+ mmHg	OR	90 mmHg or higher
Hypertensive crisis (call medical provider immediately)	>180 mmHg	AND/ OR	>120 mmHg

PRE-PARTICIPATION SCREENINGS

When reviewing the pre-participation screening documents, one of the things we are looking for is risk for cardiometabolic diseases. We want to identify people who may have contraindications to exercise. Exercise reduces the risk of developing cardiometabolic diseases, and individuals who are at an elevated risk should be encouraged to exercise if it is safe to do so (they may need to check with their medical care providers to confirm any exercise restrictions).

Individuals who are regularly exercising and have no diagnosis, signs, or symptoms of a cardiometabolic or renal disease have little restrictions on their exercise testing and prescription plan. It is recommended that individuals who are not participating in regular

exercise and have a cardiometabolic or renal disease, or signs and symptoms of a cardiometabolic or renal disease, not participate in exercise testing or training until they receive medical clearance. If the person does not have cardiometabolic or renal disease, or any signs or symptoms, they may start with light to moderate exercise.

	Medical clearance recommended?	**General exercise plan**
No diagnosis, signs, or symptoms of cardiometabolic or diseases	Not recommended	Start with light to moderate exercise and progress as recommended by ACSM guidelines
Known cardiometabolic or renal disease but no signs or symptoms	Recommended	After medical clearance is received, start with light to moderate intensity exercise and may progress if tolerated
Signs and/or symptoms of cardiometabolic or renal disease	Recommended	After medical clearance is received, start with light to moderate intensity exercise and may progress if tolerated

CLASS ACTIVITY

ACTIVITY 1: BLOOD PRESSURE MEASURES

Equipment: Stethoscope, sphygmometer

Participant: One person to measure blood pressure, one person to have their blood pressure measured.

Instructions for resting BP measures:

- *Note: do not put the stethoscope in your ears until you are sure the stethoscope head is not going to bump or rub against anything*

Resting blood pressure:

1. Have the participant sit in a chair, with legs uncrossed, feet on the floor, and measurement arm outstretched and relaxing on the table at about the level of the heart. Refrain from speaking with the participant during the measurement.
2. Selected the sphygmometer with the cuff that fits the participant. When the cuff is wrapped around their bare upper arm (1-2" above the crease of the elbow), it should fit within the guidelines of the cuff
3. Place the stethoscope head over the participants brachial artery near the cubital fossa. If you need to hold it in place, be sure you use your fingers and not your thumb.
4. Pump up the cuff. You should pump it up about 20mmHg past where you hear the last sound
5. Slowly release the pressure from the cuff. Note the number that corresponds to the first sounds you hear (this is SBP) and the last sound you hear (this is DBP)
6. Fully deflate the cuff
7. Remove the cuff and inform the participant of their blood pressure

Exercise blood pressure: Repeat the seven steps above, but either immediately after the person does 20 jumping jacks, or while they are actively cycling on the stationary bicycle.

Additional reading: More in-depth instructions can found here: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3936692/pdf/jceh_26_84_076.pdf

Video #1: ACSM Blood Pressure Assessment Technique

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Video #2: How to: Measure Blood Pressure (Another example)

- This video discusses more of the technique in taking a BP measurement (in a healthy person, you do not need to automatically pump the cuff up to 200mmHg. Instead, 20mmHg above the last sound you hear is acceptable).

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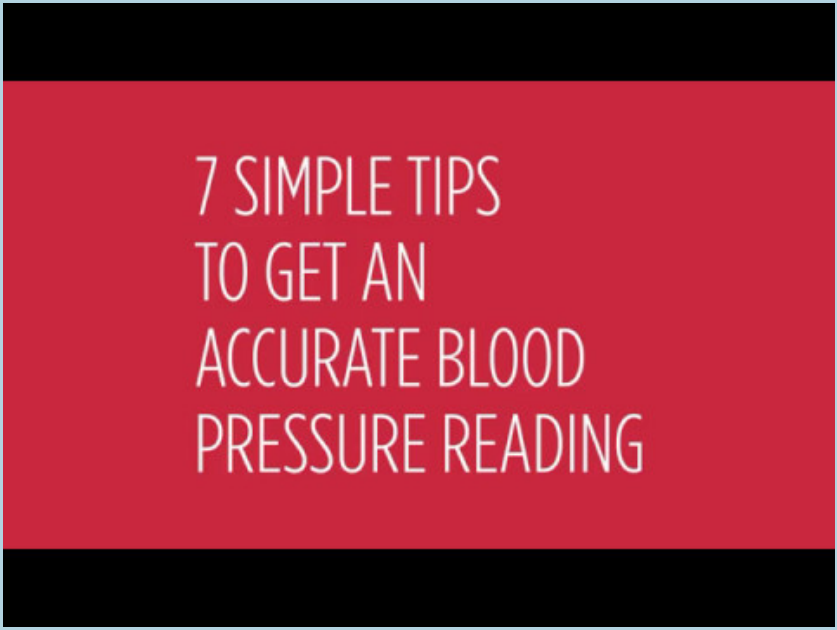
Video #3: 7 Simple Tips To Get An Accurate Blood Pressure Reading

- This is a good video for common sources of error in BP measures.



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Virtual Lab Activity 1:

Practice reading blood pressure: Watch the video: Blood Pressure: Audio-Visual Coordination Skills

Follow along with the video and practice accurately identifying the systolic and diastolic BP sounds.

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ACTIVITY 2: HEART RATE AND PULSE RATE MEASUREMENTS

Equipment: Polar HR monitor (watch and chest strap)

Participant: One person (yourself) or two people (practice measurement on someone else)

Additional reading: HR strap placement (with pictures!) from Polar https://support.polar.com/en/support/tips/How_to_wear_a_heart_rate_sensor_with_textile_strap

Instructions for heart rate measure using a Polar HR monitor:

1. Have the participant fit the strap around their ribcage at the point just below the pectoral muscles. If their skin is dry or the weather is dry, the person may need to wet the strap electrodes with water or ECG gel
2. Turn on the Polar watch, hold within 3 feet of the participant, and make sure the watches received a signal.
3. Once a signal is received, it will take about 10-15 seconds for the reading to appear

Instructions for radial pulse measure:

1. Use two fingers to palpate the participant's wrist along the radius (in *most* people, the radial artery runs approximately on top of the radius)
2. When you feel the pulse, start your count for 15 seconds
3. Multiple your 15-second count by four to calculate beats per minute (BPM)

Note: For some exercise tests, it is important to do the pulse count for a specific interval of time and not *multiply it. For example, if using pulse to approximate exercise recovery the rate of return to resting values will vary based on the individual's fitness and it*

is important to not take a "short cut" by using a shorter duration for the pulse count and multiplying the value.

Virtual Lab Activity 2:

Practice measuring radial pulse: Follow the instructions above for finding your radial pulse measure.

1. Find your resting pulse (sit for ~5min before measuring your pulse).
2. Find a post-exercise pulse rate (perform a short cardio activity such as 20 jumping jacks, then measure your pulse).

ACTIVITY 3: PAR-Q+

Equipment: PAR-Q+ (or PARmed-X for pregnant individuals)

Participant: Everyone will complete their own PAR-Q+ or PARmed-X

Additional reading:

PAR-Q+: http://eparmedx.com/wp-content/uploads/2013/03/January2020PARQPlus_Image.pdf

PARmed-X: http://www.csep.ca/cmfiles/publications/parq/parmed-xpreg.pdf

Instructions: Complete your PAR-Q+ or PARmed-X.

Virtual Lab Activity 3:
Complete PAR-Q+ or PARmed-X: This does not need to be turned in. Use this to self-assess your readiness for physical activity.

QUESTIONS

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CHAPTER 3

Chapter 3: Assessing general skeletal muscle function

MELISSA MARKOFSKI

BACKGROUND

ASSESSING GENERAL SKELETAL MUSCLE FUNCTION

Skeletal muscle strength is of great interest to a wide range of people. It is commonly used by people wishing to improve their fitness, as a goal for athletes, and to assess decline in clinical and aging populations. This is a wide range of applications, and as such there are a wide range of tests that can be performed. This lab will cover three different assessments: skeletal muscle endurance, strength, and static (isometric) strength.

Skeletal muscle strength can be measured by isometric, isokinetic, or isotonic testing. Some populations, such as unfit older adults or other groups at a high risk of injury, are often tested with isometric exercises. Athletic and young, healthy populations are typically tested with isotonic exercises. As with aerobic endurance testing, muscular strength testing can be a maximal effort, or a

submaximal test that will estimate maximal strength. For this lab, we will assess skeletal muscle endurance and strength with isotonic and isometric tests.

Health and safety warning: As with all activities in this class, only perform the activities you feel are safe for you to complete. Always follow your medical care provider's recommendations.

CLASS ACTIVITY

ACTIVITY 1: UPPER BODY SKELETAL MUSCLE STRENGTH AND ENDURANCE (PUSH-UP TEST)

Push-up tests are a simple method for testing skeletal muscle strength and endurance in healthy individuals. This test requires little equipment and space, and can be conducted as either a one-on-one test or as a field test. However, it is not well-suited for all age ranges or people with shoulder injuries.

Research spotlight: Researchers followed male firefighters for 10 years. Those who could perform 40 push-ups at the start of the observation period had the lowest risk of cardiovascular disease. Read more: https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2724778

Equipment: Workout mat

Participant: Each person (who is cleared for activity and does not have shoulder concerns) will participate in the activity

Additional reading: Your textbook (page 97) has additional instructions and pictures. Use this table to interpret the results: https://canadacollege.edu/fitnesscenter/assess-muscle-endurance.php

Instructions: (*abbreviated from your textbook)*

Notes: only count complete push-ups in the correct form

1. Stand in the push-up "down" position. Men: start in the standard push-up position. Women: start on knees, with lower legs on the floor and feet planter flexed and laying on top of the mat
2. Raise the body by straightening the elbows to just before they lock, then return to the staring "down" position. This is one repetition.
3. Continue with good technique (back straight, arms fully extended) until the participant is unable to maintain the correct technique for two repetitions. After the first incorrect push-up technique, give a warning to the participant. Although this is not a cadence test, if the participant requires a rest of more than ~3 seconds between repetitions the test can be terminated for excessive rest.
4. Compare your results with the table in the link above.

Virtual Lab Activity 1:

Perform the push-up test:

1. Using the instructions above (from your textbook), perform the push-up

test.
2. Note the maximum number of push-ups you were able to complete.
3. Use this table (https://canadacollege.edu/fitnesscenter/assess-muscle-endurance.php)
to assess your fitness classification (Needs Improvement -> Excellent).

ACTIVITY 2: LOWER BODY SKELETAL MUSCLE STRENGTH AND ENDURANCE (SINGLE-LEG WALL SIT)

This test measures lower body skeletal muscle strength and endurance and requires little equipment and space. However, it is not well-suited for all age ranges or people with lower body or knee injuries.

Equipment: Wall space, timer

Participant: Each person (who is cleared for activity and does not have lower body or knee concerns) will participate in the activity

Additional Reading: This website has the scoring and normative data for the single-leg wall sit test: https://www.topendsports.com/testing/tests/wall-sit.htm

Instructions:

1. Stand with your back against a wall with feet shoulder length apart.
2. Slowly slide down the wall until your knees and hips are both at 90 degree angles.
3. Start the timer when one foot is lifted off the ground. Stop

the timer when the subject can no longer hold their foot off the ground.

4. Perform this test with both the right and left leg.
5. Compare the times for both legs with the table in the link above.

Virtual Lab Activity 2:

1. Perform the single-leg wall sit for both the right and left legs
2. Compare both your results with this table to assess your fitness classification: https://www.topendsports.com/testing/tests/wall-sit.htm

ACTIVITY 3: SKELETAL MUSCLE ENDURANCE TESTING

This test uses the stacked weight machines common in many fitness centers. Participants cleared for strength testing can complete the muscular endurance test. This protocol can be conducted on either the lat pulldown machine or the leg extension. This test uses a relative weight for the strength assessment.

Equipment: Lat pull down and leg extension machine

Participant: Anyone cleared for weight training can participate. If a participant has a knee concern, the lat pulldown exercise should be used. If a participant has shoulder concerns, the leg extension exercise should be used.

Instructions:

1. Calculate the weight the participant will use in this

exercise. For the lat pulldown, men will use 66% of their body weight, and women will use 50%. For the leg extension, both men and women will use 50% of their body weight. Round to the nearest weight available on the machine.

2. Set the machine for the participant's height.
3. Count how many repetitions can be safely completed.
4. Compare the results to the table below:

Repetitions	Fitness category
>13	Excellent
12-13	Very good
10-11	Good
8-9	Fair
6-7	Poor
<6	Very poor

Virtual Lab Activity 3:

Practice Calculations:

1. A female weighing 140 lbs is going to perform the lat pulldown test.
   - 1a. What should the weight on the machine be set to?
   - 1b. If she performs 14 repetitions, what fitness category is she in?
2. A male weighing 166 lbs is going to perform the leg extension test.
   - 2a. What should the weight on the machine be set to?
   - 2b. If he performs 10 repetitions, what fitness category is he in?

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ACTIVITY 4: STATIC LEG STRENGTH

Equipment: Goniometer, static strength platform

Participant: Anyone cleared for weight training can participate. A second person is needed to check the joint angle prior to the start of the test.

Instructions:

1. Have the participant stand on the platform in a partial squat while holding the hand bar across their thighs. Using a goniometer, confirm that the participant's knees are flexed at an angle between 130-140° and adjust the length of the chain as needed.
2. After a brief post-setup rest, the participant holds the hand bar with a pronated grip and rests the bar across their thighs.
3. Using only the legs (not the back), slowly extend the knees and exert as much force as possible.
4. The participant will do two attempts with a one minute rest in between. Record the highest attempt.
5. Convert to kg and use the table in the Blackboard folder

for this lab to look up strength classification (use the “Leg strength (kg)” column for this test).

Video: Example of a lower body static strength test

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Virtual Lab Activity 4:

Practice Determining Fitness Classification:

1. Practice determining the fitness classification for the participant below. (The table used is located in the Blackboard folder for this weeks lab)

Hint For this test, remember that the highest score is used, not the average.

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CHAPTER 4

Chapter 4: Flexibility and agility testing

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BACKGROUND

FLEXIBILITY

Flexibility is one of the five components of physical fitness. When prescribing an exercise prescription that includes exercises to increase flexibility, the exercises can be static, ballistic, or proprioceptive neuromuscular facilitation. Flexibility can be influenced by many factors, including muscle properties, physical activity and exercise, anatomical structure, age, and sex.

To test flexibility, goniometers, sit-and-reach tests, and functional movement screenings are the most commonly used methods. Testing for flexibility is highly specific, meaning it only relates to the specific joint being tested. For this reason, a comprehensive flexibility assessment will include several measures. For the purpose of this lab, we will use some of the more popular methods to conduct a limited assessment of flexibility.

AGILITY

Agility relates to effectively changing direction, velocity, or mode in response to a stimulus. It is an important skill for many sports activities. For example, in football and soccer the ability to quickly change directions is a desirable skill. Some of the tests used to test agility, such as the hexagon test, can also be used as a drill to improve agility.

CLASS ACTIVITY

ACTIVITY 1: GONIOMETER MEASURES

Equipment: Goniometer

Participant: Range of motion (ROM) of participants can be measured on one or more joints. Participants without orthopedic limitations can perform sit-and-reach tests, agility tests, and functional movement testing.

Additional reading: Textbook REP pp 121-184 and tables referenced in these pages

Instructions:

1. Using a goniometer and the instructions in REP Table 5.1, measure hip flexion, hip extension, or glenohumeral flexion. Table 5.1 will instruct you on where to place the goniometer.
2. Measure twice and calculate the average.
3. If the two measures differ by more than 3 degrees, collect a third measurement.

Video #1: Example of Hip Flexion ROM measurement with goniometer

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Video #2: Example of Hip Extension ROM measurement with goniometer

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Video #3: Example of Glenohumeral Flexion ROM measurement with goniometer

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Virtual Lab Activity 1:

Practice Understanding ROM measurements:

1. Answer the questions in the activity box below.

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(Optional) Virtual Lab Activity:

1. Make your own goniometer at home https://www.instructables.com/id/Goniometer-for-Joint-Range-of-Motion-Measurement/
2. Practice measuring hip flexion, hip extension, and glenohumeral flexion on a willing participant.
3. Compare their results with table 5.1 in your textbook

ACTIVITY 2: ASSESS HIP AND HAMSTRING FLEXIBILITY

USING A STANDARD SIT-AND-REACH TEST

Equipment: Sit-and-reach box (or a meter stick/measuring tape for an at-home version)

Participant: Participants without orthopedic limitations can perform the sit-and-reach test. If there are concerns about the back and/or hamstring, a modified test can be used instead (bend one knee to form a "4")

Additional reading: Textbook REP pp 121-184 and tables referenced in these pages

Instructions:

1. Sit on the floor with back against the wall, knees extended, and feet flat against the inside of the box and the medial edges of the feet six inches apart from each other.
2. Keeping knees fully extended and arms stretched in front of the body, reach as far as possible along the top of the box.
3. The hands must be flat and pronated (can overlap or just touch) and stay parallel to the ground.
4. Attempt three times (no bouncing between attempts!) and use the best of the three measures to compare to REP Table 5.2.

Video #1: Example of how to perform a sit-and-reach test with a sit-and-reach box

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Video #2: Demonstration of using a measuring tape and adhesive tape to conduct a sit-and-reach test.
To use with the table in your text, have the heels of your feet resting at 26cm on the measuring tape/meter stick. If you do not have a measuring tape, you can use string or paper and measure after your test.

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Virtual Lab Activity 2:

Perform a sit-and-reach V test at home:

1. Use the instructions above, and Video #2 for reference, set up and perform this test.
2. Determine your flexibility fitness category by using Table 5.2 in your textbook.

Additional practice determining flexibility category:
1. Determine the flexibility category:
A 32 year old male had 3 sit-and-reach attempts of 30cm, 32cm, and 28cm. What was his fitness category?
(Assume the "zero" point was set at 26cm)

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ACTIVITY 3: T-TEST

Equipment: Stopwatch, cones

Participant: Everyone who does not have a relevant orthopedic limitation will participate.

Additional reading: This website has an illustration of the set-up for the T-test and the norms data table you will use to categorize

your result: https://www.professionalsoccercoaching.com/agility-drills/t-test-agility

Video: Demonstration of an agility T-test:

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Instructions:

Note: Every participant runs two trials of the T-test. Before the two times trials, run one or two T-tests at submaximal effort to warm-up and familiarize yourself with the test. The position for the test is always

facing the top part of the T (no rotating) and touching the base of the cones.

1. Start at cone A and face cone B.
2. When told to start, run forward and touch the base of cone B.
3. Shuffle to the left and touch the base of cone C.
4. Shuffle to the right and touch the base of cone D.
5. Shuffle to the left and touch the base of cone B.
6. Run backwards and past cone A.
7. The clock should be stopped when the participant runs past cone A.

Virtual Lab Activity 3:

Perform a T-test:

1. Follow the instructions above to perform a T-test.
2. Record the time of your two trial runs.
3. Using your fastest time, find your fitness category using the link above.

ACTIVITY 4: HEXAGON TEST

Equipment: Stopwatch, hexagon tape outline

Participant: Everyone who does not have a relevant orthopedic limitation will participate.

Hexagon test set-up: Each side of the hexagon is 24 in. in length.

Each angle is 120 degrees. The hexagon can be made with tape, drawn with chalk, or any similar setup.

Video: How to conduct (and participate in!) the test:

A YouTube element has been excluded from this version of the text. You can view it online here: https://uhlibraries.pressbooks.pub/kin4370labmanualvirtual/?p=29

Instructions:

Note: Everyone does this test twice, once each at clockwise and counterclockwise rotation. Warm-up by practicing the test in both directions at a submaximal effort. For the test, if you fail to jump over

the line (or land on it) or take an extra step, the test is stopped and restarted after time for recovery.

1. Start in the middle of the hexagon.
2. Starting with the line in front of you, jump over the line and back to the center.
3. Continue by jumping over the next line in the clockwise or counterclockwise rotation.
4. The timer is stopped after the participant has jumped over *all six sides three times* (three complete passes) and returns to the center.
5. Compare your clockwise and counterclockwise times to each other and this table (numbers listed are seconds): https://wiki.ubc.ca/File:Normative_Data_(National_Norms)_for_the_Hexagon_Agility_Test.png

Virtual Lab Activity 4

Perform a Hexagon Test:

1. Follow the instructions above to make a hexagon and perform the test.
2. Record your times for both the clockwise and counterclockwise trials.
3. Compare your times to the Normative Data (National Norms) for this test.

ACTIVITY 5 (OPTIONAL ACTIVITIES): AGILITY DRILLS

If you are interested in more agility drills, here are a couple of examples. These are not required for the lab, but are optional activities.

Agility practice with ladder

Run through the ladder twice for each of these, alternating lead foot or direction (as appropriate): double run (run through ladder, and both feet have to be in the box before running to the next box), side jumps (face the side of the ladder and jump through each box), and in and out (face side of ladder, and jump in and out of the boxes—over the red line).

Agility practice with agility balls.

Stand ~ 10 feet from your partner. Throw the ball about halfway between the two of you, and the other person must "catch" the ball.