Gauge Your Gait
Activity 2B

Activity Overview

Objectives:

Students will be able to:

- Work in a **collaborative group** with assigned roles to complete a given task
- Examine the various parts of the **gait cycle** through an interactive lab
- **Report their findings** using charts, graphs, and simple calculations

Activity Description:

By performing the ***Gauge Your Gait*** Lab, students will observe their normal gait and calculate ***cadence, stride length*** and ***velocity***. They can then compare their results to the rest of the class and observe if there were great differences. This lab uses common, easily-obtained materials.

Students will work in groups of four to perform this activity. The student group roles include ***Walker***, ***Measure Master***, ***Reader***, and ***Timekeeper***. Task cards are included and one set should be copied for each group.

Activity Background:

When walking with a group of people, have you ever noticed that you have a hard time keeping up with some while at the same time leaving others far behind? The reason for these differences can be identified by examining a person's ***gait***. The term gait simply refers to an individual's style or manner of walking. Gait analysis involves determining factors such as a person's ***velocity*** and how large their steps are, which determines ***stride length***. By understanding these concepts, students will be able to see how these factors influence the way a person moves and understand why we walk so differently. Gait analysis is also an indicator of overall health, therefore, doctors and caregivers analyze gait in order to better understand and care for their patients.

The general ***gait parameters are cadence, stride length,*** and ***velocity***. These gait parameters are studied in laboratories by means of sophisticated devices consisting of transducers, computers, high-speed film, and electromyographic machines. These parameters can be measured in the classroom by simply using a stopwatch, meter stick, dark paper, and some talcum powder.

- ***Cadence*** may be determined by counting the number of individual steps taken during a period of time measured using a stopwatch. A person's cadence can be calculated using the formula:

$$\text{Cadence (steps/min)} = \frac{\text{steps counted} \times 60 \text{ sec/min}}{\text{time (sec)}}$$

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- *Velocity* is measured by timing the student while he or she walks a known distance. Mark off a start line, measure 6-10 meters and mark off a finish line. *Velocity* is then *calculated* as follows:

$$\text{Velocity (m/sec)} = \frac{\text{distance (m)}}{\text{time(sec)}}$$

- *Stride length* can be determined in two ways – by direct measurement, or calculated by using velocity and cadence.
- To determine the *calculated stride length*, measure **cadence** and **velocity**, and then use the following formula:

$$\text{Stride length(m/stride)} = \frac{\text{velocity (m/sec) x 60 sec/min x 2 steps/stride}}{\text{cadence (steps/min)}}$$

- Determining *measured stride length* involves having an assigned student step with both feet in a shallow tray of talcum powder, walk across a section of dark-colored butcher paper, and leaving a trail of footprints. Then measure stride length using a meter stick. Use *Figure 1 Step and Stride* below to make sure you are measuring correctly.

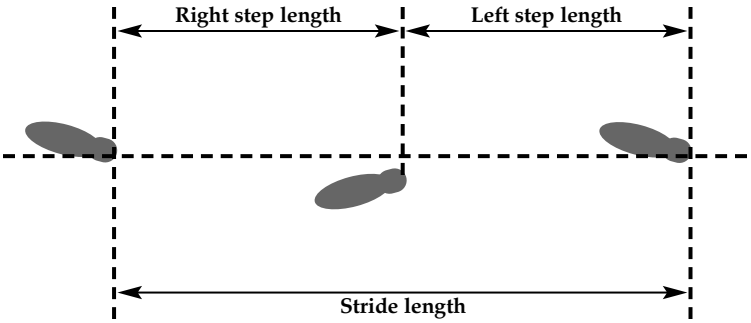

Figure 1 – Step and Stride

Activity Materials: (per group)

- 12 meters dark-colored butcher paper
- Talcum powder to fill shallow tray
- Shallow tray (such as a cookie sheet)
- Masking tape
- Stopwatch
- Meter stick
- Calculator
- 2 pieces graph paper

Activity Management Suggestions:

Have students work in groups of four to complete the activity. Be sure to assign each member of the group a role and give each a task card with their job clearly described. Copy 1 set of task cards per group.

Remind students that they cannot change jobs in the middle of the lab. The reason for this stipulation is consistency in collecting data.

For students needing more assistance: Group these students with peers who can assist them during the lab and assign these students the role of the *Walker* during the lab

For highly able students: Assign these students the role of the *Measure Master* during the lab and allow these students to work on the extension activity

Extension:

Inquiry: Students can investigate the effect of wearing a backpack, wearing high heels, running, or walking backwards on *stride length, cadence,* and *velocity*. Students will design their procedure. Be sure to tell students that they must get approval from you before beginning the investigation.

References Used:

Whittle, Michael. (1991). *Gait Analysis An Introduction*. Oxford: Butterworth-Heinemann Ltd.