THE MARGARIA-KALAMEN STAIR CLIMB TEST IS A CLASSIC TEST USED TO assess leg power and activation of the phosphagen energy system.

**Equipment:**
- Flight of stairs with the following:
  - ✔️ A 20-foot (6-m) flat surface in front of the stairs.
  - ✔️ Nine or more steps with the third, sixth, and ninth steps clearly marked with tape.
  - ✔️ Measure the vertical height between the third and the ninth steps, as this value is used in the power calculation.
- Tape measure
- Stopwatch
- Marking tape
- Timing mats (optional). Timing mats allow for more accurate timing, as the clock starts and stops upon foot impact.

The figure below illustrates the setup for this test.

**Pre-test procedure:**
- After explaining the purpose of the stair-climb test, describe and demonstrate the procedure. Allow the client to warm up and perform a few practice trials before administering the test.
- The client will sprint toward the stairs from a standing start 20 feet (6 m) from the base of the stairs.

**Test protocol and administration:**
- Record the client’s weight in kilograms.
- The client stands 20 feet (6 m) away from the base of the stairs and starts the test whenever he or she is ready.
- Start the stopwatch when the client’s foot hits the third step and stop it when the client lands on the ninth step.
- ✔️ To increase the accuracy of the test, it is recommended that a second person also time the client’s performance. Use the average of the two times as the “actual” time for each attempt.
- Allow three trials, with two to three minutes recovery between attempts.
- The fastest time achieved is recorded on a testing form.
- The following formula is used to assess power.

$$\text{Power} = \frac{\text{Vertical height} \times \text{Time}}{\text{Weight}}$$

The table on the next page will rank the client’s performance.
Calculating Power

\[
\text{Power} = \frac{(\text{Body weight} \times 9.807) \times \text{Height}}{\text{Time}}
\]

Weight in kg; Height = vertical distance between step 3 and step 9 in meters; Time = seconds

Example: John weighs 180 lb and scored a best attempt of 0.8 seconds when climbing six steps with a combined height of 49.5 inches.

\[
\begin{align*}
180 \text{ lb} &= 81.8 \text{ kg} \\
49.5 \text{ inches} &= 0.126 \text{ m} \\
\text{Power} &= \frac{(81.8 \times 9.807) \times 1.26}{0.8} \\
\text{Power} &= 1,262 \text{ watts}
\end{align*}
\]