Name: _____

Going the (Horizontal) Distance: An Inquiry Activity

SPH4C

Materials: metre stick, stopwatch, masking tape

Procedure: The formula you will use to calculate your work done while accelerating is:

$$W = \Delta E_k = \frac{1}{2} m v_2^2 - \frac{1}{2} m v_1^2$$

Since you will be starting from rest, $v_1 = 0$ and therefore $W = \frac{1}{2} m v_2^2$

What is your mass in kilograms? _____

Mark your starting position with masking tape. Measure 10 metres down the hallway and mark your finish line with another piece of masking tape. This is your distance Δd .

Time how long (in seconds) it takes you to run the 10 metres from a standing start. This is your time Δt . (Cross the 10 metre mark at your maximum speed. Do not slow down as you approach it.) Repeat this measurement 3 times and calculate your average time.

Table 1: Time to run 10 metres from a standing start

Time for Trial 1 (s)	Time for Trial 2 (s)	Time for Trial 3 (s)	Time for Trial 4 (s)	Average Time (s)

Since your initial speed was zero, your final speed is twice your average speed:
(Use your average time in this calculation.)

$v_2 = 2 v_{avg} = 2\left(\frac{\Delta d}{\Delta t}\right)$ =

Use this speed to calculate your work done in Joules:
(Remember to square your speed.)

$W = \frac{1}{2} m v_2^2$ =

Use this work done to calculate your power output in Watts:

$P = \frac{W}{\Delta t}$ =

To convert your work done while accelerating to Calories:

$$W = \_\_\_\_\_ J \times \left(\frac{1 Cal}{4186 J} \right) = \_\_\_\_\_ Cal$$

To convert your power while accelerating to horsepower:

$$P = \_\_\_\_\_ W \times \left(\frac{1 hp}{745.7 W} \right) = \_\_\_\_\_ hp$$

Discussion:

Why did we use a short distance and not a longer distance (such as 100 m) in this activity?

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And, again, how do we burn most of our food Calories consumed?

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