

LAB QUIZ: HUMAN HORSEPOWER

The data below were collected in the gym, using the same methods as were used in lab.

STEP HEIGHT (m)			AVERAGE STEP HEIGHT (m)	TOTAL NUMBER OF STEPS N	FLIGHT HEIGHT $h = \text{avg} \cdot N$ (m)
STEP 1	STEP 2	STEP 3			
0.183	0.18	0.175		15	
RUNNER MASS m (kg)		RUNNER WEIGHT mg (N)		TIME TO CLIMB (s)	
75		(75)(9.8) =		3.75	

- Calculate the average step height.
A) 0.175 m B) 0.179 m C) 0.180 m D) 0.181 m E) 0.183 m
- If the runner climbs 15 steps, calculate the height of the flight of stairs.
A) 0.180 m B) 1.50 m C) 1.80 m D) 2.69 m E) 15 m
- Calculate the weight of the runner.
A) 7.65 N B) 75 N C) 165 N D) 500 N E) 735 N
- Calculate the work (in Joules) done by the runner to climb the stairs.
A) 132 J B) 527 J C) 1977 J D) 2756 J E) 7414 J
- Calculate the power developed by the runner in Watts.
A) 132 W B) 527 W C) 1977 W D) 2756 W E) 7414 W

For the remaining questions, assume that a 70kg runner does 1850 J of work and develops 900 W of power by running the flight of 15 stairs very quickly.

- Convert 900 W into units of horsepower.
A) 0.83 hp B) 1.2 hp C) 13 hp D) 746 hp E) 900 hp
- How many calories does this runner burn climbing the stairs?
A) 0.440 cal B) 0.650 cal C) 0.880 cal D) 1.20 cal E) 4.50 cal
- A Snickers bar contains 240 calories, or 1 million Joules of energy. How many times would this runner have to climb the stairs to burn the candy bar?
A) 105 times B) 240 times C) 545 times D) 1 million times