

WORK-ENERGY-POWER

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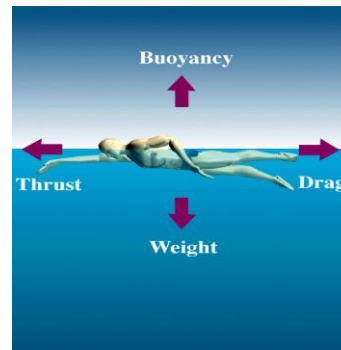
Com. College, 1212 Rio Grande St., Austin Tx. 78701, jpcise@austincc.edu & NYTimes Oct. 8, 2016 by Associated Press in NYTimes

Colorado Woman Swims Nearly 82 Miles, Likely Setting Record



Sarah Thomas during the last mile of her 56-hour swim across Lake Powell. She said she was concerned about staying awake.

INTRODUCTION: $P = \text{Power} = \text{work}/\text{time} = F x/t = F v$. For swimmers $F = b v$ where b is a frictional coefficient depending on shape and surface in contact with water.



When moving at constant speed v the thrust (F) is equal to frictional force $f = b v = F$ Thus, $P = F v = b v^2$. **P for an average swimmer is about 148 ft. lb./s.** ...about .27 HP
Note: ave. horsepower is 550 ft./lb./s.

QUESTIONS: (a) Find her speed in mph?, (b) Convert speed to ft./s.? (c) Find frictional coefficient b ? (d) Find thrust force F ?, (e) Find drag or friction force f ?

PHOENIX — A Colorado woman who **completed a nearly 82-mile swim across Lake Powell in 56 hours**) said Friday that the vast distance was not her biggest fear. “I wasn’t concerned about the distance,”

Sarah Thomas said a day after completing what is **believed to be a record-breaking marathon swim**. “I had trained and worked for that part. But how do you stay awake that long?” Thomas, who was still in bed after sleeping nearly 12 hours, said she credits the “little bit of caffeine” in the liquid carbohydrate and electrolyte mixtures she consumed every 30 minutes during the swim for helping her to keep going. Thomas, 34, did not stop swimming or get out of the water the entire time, allowing her to qualify for a possible record for an unassisted marathon swim. A team of 13 people traveled by houseboat with her and gave her food every half-hour via a water bottle tied to a cord. Thomas swam mostly freestyle but occasionally switched to backstroke or breaststroke to loosen up. Thomas has no plans for more marathons until the Cook Strait in New Zealand in 2018. In the meantime, she plans to just keep swimming. Distance, not speed, has always been the draw for her.

“I may not be the fastest, but I’m happy to keep going and going,” she said.

QUESTIONS(CONTINUED): (f) Convert 82 miles into ft.? , (g) Find amount of work she did while swimming 82 miles?

HINTS: $60 \text{ mph} = 88 \text{ ft./s.}$, $P = F v = b v^2$, $F = f = b v$, Work = force x displacement = $F x$

ANSWERS: (a) $v = 1.464 \text{ mph}$, (b) $v = 2.1472 \text{ ft./s.}$, (c) $b = 32.1 \text{ lb. s./ft.}$, (d) $F = 68.93 \text{ lb.}$, (e) $f = 68.93 \text{ lb.}$
(f) $x = 432,960 \text{ ft.}$, (g) Work she did = $29,843,933 \text{ ft. lb.} = \sim 30 \times 10^6 \text{ ft. lb.} = 30 \text{ million ft. lb.}$