

WORK-ENERGY-POWER

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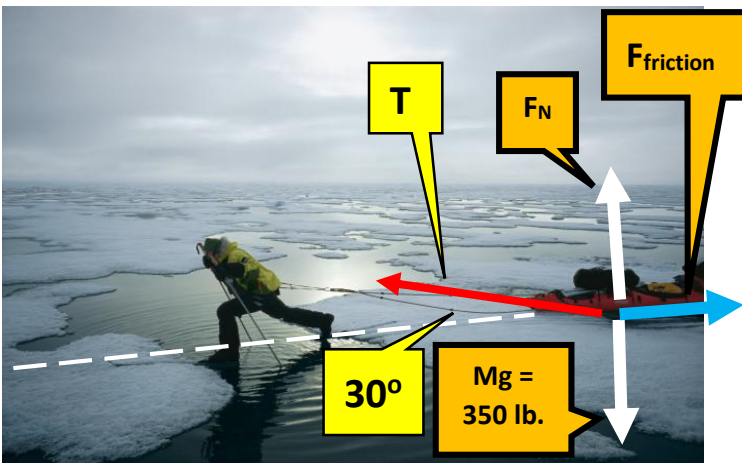
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Melting: Last Race to the Pole,' an Adventure Way Up North



The adventurer Eric Larsen and his sled negotiate a crevice in Animal Planet's "Melting: Last Race to the Pole."

A good preparation for winter is to watch one of the many cold-weather reality shows on cable, and this year [Animal Planet](#) has a particularly dramatic offering, a special at 9 p.m. Wednesday, Dec. 9, called "Melting: Last Race to the Pole." It follows two adventurers, [Eric Larsen and Ryan Waters](#), as they try to make their way unaided across the Arctic Ocean to the North Pole, a journey few have completed and now made all the more treacherous by the Arctic ice melt. Leaving from Ellesmere Island in Canada, near Greenland, the two try to beat the record of 49 days for the trip. **An unaided trek, as the narration explains, means "no airdrops of supplies, no dog teams, just skis and snow shoes, dragging sleds loaded with everything they'll need to survive for nearly two months on the ice."** The imagery is beautiful, but the program raises the possibility that the two men may be among the last to conquer the route because of global warming.



INTRODUCTION: In 2014 Eric and Ryan actually completed this 500 mile trek from northern Canada's Ellesmere Island. They didn't break the record 49 days to complete the trek, but were successful in 53 days. Each pulled a 350 lb. sled of supplies. The coefficient of friction between sled and snow is 0.1. Thus, moving at constant velocity, the horizontal component of the pulling force ($T \cos. 30^\circ$) balances the retarding frictional force ($f = \mu F_N$). Thus, horizontally: $0.87 T = 0.1 F_N$, eq.1 . Vertically, with no acceleration vertically, the sum of the forces must = 0. $T \sin. 30^\circ + F_N = 350$ eq.2 Solving eq. 1 & 2 for T we find $T = 38.04 \text{ lb.}$

QUESTIONS: (a) Eric & Ryan trekked 8 hrs. per day for 53 days. How hours in 53 days were they trekking? (b) What was their average speed(velocity) in mph? (c) Convert trekking speed to ft./s.?, (d) Find each trekkers individual power output in ft. lb./s. ? (e) Convert trekker's power in ft.lb./s. to horsepower? (f) Convert 500 miles to feet? (g) Find work each trekker did pulling the sled 500 miles?

HINTS: $x = v t$, $60 \text{ mph} = 88 \text{ ft./s.}$, $P = F v$, $550 \text{ ft.lb./s.} = 1 \text{ HP}$, $5280 \text{ ft.} = 1 \text{ mile}$, $\text{work} = (\text{force}) \times (\text{displacement})$

ANSWERS: (a) 424 hrs., (b) $v = 1.18 \text{ mph}$, (c) $v = 1.73 \text{ ft./s.}$, (d) 65.8 ft.lb./s. , (e) $\sim 0.12 \text{ HP}$, (f) $2,640,000 \text{ ft.}$, (g) $100,425,600 \text{ ft. lb.}$

COMMENT: The computed power of 0.12 HP is a little more than normal humans. But, this is as expected since both Eric & Ryan are very athletic trekkers. This documentary movie (Melting: Last race to the pole)is a exceptional testimonial to extreme human effort to accomplish this trek to North Pole. They even had to swim at some points.