HEAT CONDUCTIVITY & SPECIFIC HEAT

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Please send Dr Cise an e-mail on how you used this NYTimes Physics application. Thanks! Dr Cise

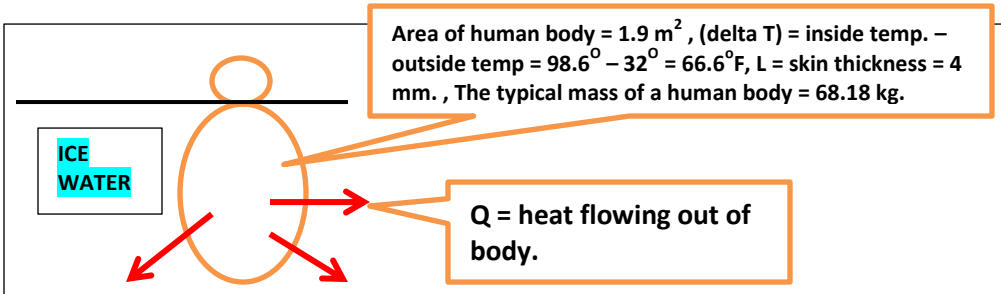
Outerwear's Spokesman Does Without Outerwear

Commercials for heated outerwear from Columbia Sportswear feature Wim Hof, right, a man known for being impervious to cold.

INTRODUCTION: Heat conductivity/time is given by this function: **Q/t = KA(deltaT)/L** ,eq1,where K = coefficient of heat conductivity , A = area , (delta T) = temperature gradient(difference in temperature), L = thickness.

Heat(Q) = c m (delta T) equation (2)
c = specific heat , m = mass of object ,
(delta T) = temperature gradient

A NEW commercial for Columbia Sportswear opens on a snowy **landscape in the Lapland** region of Northern Finland, where a bearded man runs barefoot, wearing only shorts and running across a frozen lake. After **jumping into a hole cut into the ice, he resurfaces from another hole**, and then is buried up to his neck in snow in an acrylic glass box. "Meet Wim Hof," says a voiceover**. "For decades he's trained his mind to help his body withstand the coldest conditions imaginable."** Mr. Hof, 52, is a Dutchman **whose feats demonstrating imperviousness to extreme cold** include climbing Mount Kilimanjaro and running a full marathon in subfreezing temperatures — in shorts Mr. Hof will soon travel to New York to promote the brand. As in the commercials, he will be demonstrating not the jacket's ability to withstand the cold but his own. While in the city on Nov. 17, **Mr. Hof will attempt to regain a Guinness World Record that he held previously for being submerged up to the neck in ice cubes,** which he will try to do for one hour and 52 minutes. While the deal had not been completed, the brand said the stunt would be broadcast on a national morning show, with hosts wearing the Omni-Heat jackets.



QUESTIONS: (a) Find (delta T) in °C ? Note: °F/°C = 9/5 (b) The coefficient of heat conductivity for human skin is 0.2 Watts/m °C . Mr Hof when submerged In ice loses heat at what rate? Q/t = ? in J/s Use the data in the box above. Eq. 1 above right is useful here. (c) To take a human body from 98.6° F to 32° F how much heat must be lost? Eq. 2 would be useful here. Note: specific heat of the human body = 3470 J/kg °C (d) Knowing the rate of heat loss from (b) and the total amount of heat needed to be lost by a human body to drop the body temperature from 98.6° to 32° in (c)……. find the time to lose all that heat in (c)?

ANSWERS: (a) 37° C , (b) ~ 3.515 X 10^3 J/s Note: J/s = watt , (c) 8.75 X 10^6 J , (d) 41.5 min