20-P-WE-JK-216-14P48

Inspired by Hibbeler, 14th Edition
Problem 14-48
Section 14.4 Power and Efficiency

Unit is a [watt], or [W]
One watt = 1 joule/second

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Image by Brina Shrenk for MECH OER
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a) A person having a mass of m = 80 kg is able to run up a flight of stairs with a height h = 4 metres in a time of t = 5 seconds. How much power is generated by the person in watts?

Power = work / time

Work = m g h = 3136 J

Power = m g h / t

Answer = 627.2 watts

b) How long in seconds would a P = 100-watt light bulb have to burn to expend the same amount of energy?

Power = work / time
Time = work / power = (3136 joules) / 100 joules/second) = 31.36 seconds