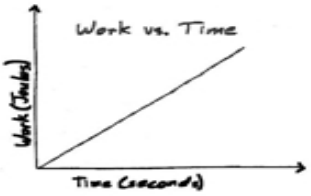
9. What is the average power developed by a motor as it lifts a 400kg mass at a constant speed through a vertical distance of 10m in 8 seconds?

$P = \frac{E}{t} = \frac{mgd}{t} = \frac{(400)(9.8)(10m)}{8} = 4905$ Watts

10. The graph shows the relationship between the work done by a student and the time of ascent as the student runs up a flight of stairs. The slope of the graph would have units of:



Slope $= \frac{rise}{run} = \frac{\Delta W}{\Delta t}$ = Power

Power

11. A motor having a maximum power rating of 81kW is used to operate an elevator with a weight of 18kN. What is the maximum weight this motor can lift at an average speed of 3 m/s? $P = Fv \Rightarrow F = \frac{P}{v} = \frac{81{,}000\,W}{3\,m/s} = 27{,}000\,N - 18{,}000\,N = \boxed{9000\,N}$

12. If the time required for a student to swim 500m is doubled, the power developed by the student will be

$P = \frac{W}{t}$

(a.) Halved
b. Doubled
c. Quartered
d. Quadrupled

13. An object weighing 15N is lifted from the ground to a height of 0.22m. The increase in the object's gravitational potential energy is: $PE = mgh = (15N)(.22m) = 3.3\,J$

14. As an object falls freely, the kinetic energy of the object
a. Decreases
(b.) Increases
c. Remains the same

15. A 10N force is required to hold a stretched spring 0.2m from its rest position. What is the spring constant? $F = kx \Rightarrow k = \frac{F}{x} = \frac{10N}{.2m} = 50\,N/m$

16. A spring has a spring constant of 10N/m. Find the force required to stretch the spring 0.25m from its equilibrium position. $F = kx = (10\,N/m)(.25m) = \boxed{2.5N}$

17. A 10N force is required to hold a stretched spring 0.2m from its rest position. What is the potential energy stored in the stretched spring? $PE = \frac{1}{2}kx^2 = \frac{1}{2}(50\,N/m)(.2m)^2 = 1\,J$

$k = \frac{F}{x} = \frac{10N}{.2m} = 50\,N/m$

18. A spring of negligible mass has a spring constant of 50N/m. If the spring is stretched 0.4m from its equilibrium position, how much potential energy is stored in the spring?

$PE = \frac{1}{2}kx^2 = \frac{1}{2}(50)(.4)^2 = 4\,J$

19. A student compresses the spring in a pop-up toy 20mm (=.02m). If the spring has a spring constant of 340 N/m, how much energy is being stored in the spring?

$PE = \frac{1}{2}kx^2 = \frac{1}{2}(340)(.02)^2 = .068\,J$