Name: _____ Work and Power Practice Problems

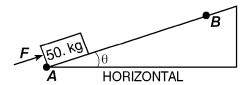
Directions: Use the Work and Power equations to answer the following questions. SHOW ALL WORK FOR THE FREE RESPONSE QUESTIONS IN THE SPACE PROVIDED

1) A girl weighing 500. newtons takes 50. seconds to climb a flight of stairs 18 meters high. What is her vertical power output?

2)A 500.-newton girl lifts a 10.-newton box vertically upward a distance of 0.50 meter. The work done on the box isA)50. JB)2,500 JC)5.0 JD)250 J

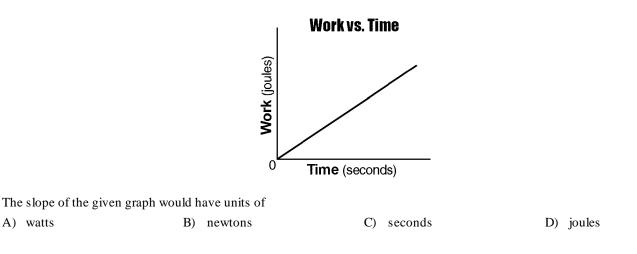
- 3) What is the maximum height to which a 1,200-watt motor could lift an object weighing 200. newtons in 4.0 seconds?
- 4) What is the average power developed by a motor as it lifts a 400.-kilogram mass at constant speed through a vertical distance of 10.0 meters in 8.0 seconds?
- 5) A student does 60. joules of work pushing a 3.0-kilogram box up the full length of a ramp that is 5.0 meters long. What is the magnitude of the force applied to the box to do this work?
- 6) A 10.-newton force is required to move a 3.0 kilogram box at constant speed. How much power is required to move the box 8.0 meters in 2.0 seconds?
- At what constant speed can a 2,000-watt motor working at full capacity vertically lift a 400-newton weight?
 A) 50 m/s
 B) 0.2 m/s
 C) 5 m/s
 D) 2 × 10³ m/s

8) The diagram below shows a 50-kilogram crate on a frictionless plane at angle θ to the horizontal. The crate is pushed at constant speed up the incline from point *A* to point *B* by force *F*.



If angle θ were increased, what would be the effect on the magnitude of force *F* and the total work *W* done on the crate as it is moved from *A* to *B*?

- A) W would remain the same and the magnitude of F would decrease.
- B) W would increase and the magnitude of F would decrease.
- C) W would increase and the magnitude of F would increase.
- D) W would remain the same and the magnitude of F would increase.
- 9) The graph below represents the relationship between the work done by a student running up a flight of stairs and the time of ascent.

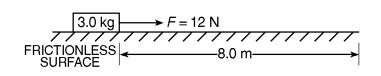


10) Two weightlifters, one 1.5 meters tall and one 2.0 meters tall, raise identical 50.-kilogram masses above their heads. Compared to the work done by the weightlifter who is 1.5 meters tall, the work done by the weightlifter who is 2.0 meters tall is

A) the same B) greater C) less

- 11) A 680-newton student runs up a flight of stairs 3.5 meters high in 11.4 seconds. The student takes 8.5 seconds to run up the same flight of stairs during a second trial.
 - (a) Determine the work done by the 680-newton student in climbing the stairs. [Show all calculations, including the equation and substitution with units.]
 - (b) Determine the power developed by the student during the 11.4-second climb. [*Show all calculations, including the equation and substitution with units.*]
 - (c) Using one or more complete sentences, compare the power developed by the student climbing the stairs in 11.4 seconds to the power developed during the 8.5-second trial.

12) A 3.0-kilogram block is initially at rest on a frictionless, horizontal surface. The block is moved 8.0 meters in 2.0 seconds by the application of a 12-newton horizontal force, as shown in the diagram below.



What is the average power developed while moving the block?

B) 96 W

A) 32 W

C) 48 W

D) 24 W