PHYS 105 · Chapter 7: Work and Kinetic Energy

Final-Exam Review — questions from PSU past final exams (Terms 182 – 242)

Constant: g = 9.81 m/s^2 · The source of each question is shown in [brackets].

Part 1: Multiple-Choice Questions (25)

Indicate the answer choice that best completes the statement or answers the question.

7.1 Kinetic Energy

Q1. *A car has a kinetic energy of 450 kJ. What kinetic energy would the car have if its speed is tripled and its mass is halved?* **[Final 211]**

A *337.5 kJ*
B *675 kJ*
C *2025 kJ*
D *450 kJ*

Q2. *A huge truck of mass 10800 kg is moving with the same kinetic energy as a 1200 kg small car moving at 15 m/s. What is the speed of the truck?* **[Final 211]**

A *45 m/s*
B *5 m/s*
C *15 m/s*
D *135 m/s*

7.2 Work and the Work–Kinetic Energy Theorem

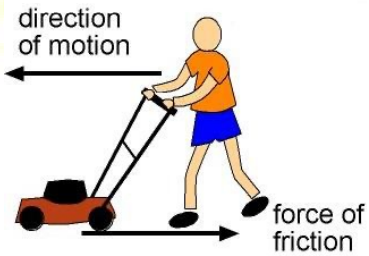
Q3. *Which of the following statements is NOT true?* **[Final 202]**

A *Work may be positive or negative.*
B *Work is a vector quantity.*
C *Work done by gravity is not always zero.*
D *Work is measured in joules.*

Q4. *Which of the following is NOT true about work?* **[Final 211]**

A *The unit of work is equivalent to Nm.*
B *Work might be negative.*
C *Net work equals the change in kinetic energy.*
D *Work done against gravity is always zero.*

Q5. *In the figure, what is the work done on the lawn mower by the friction force?* **[Final 221]**



A *Positive*
B *Negative*
C *Zero*
D *None of the above*

Q6. *The total (net) work done on an object is always equal to:* [Final 182 · Final 222]

A *its kinetic energy*
B *its change in mechanical energy*
C *its change in potential energy*
D *its change in kinetic energy*

Q7. *If the kinetic energy of an object decreases, then the net work done on the object is:* [Final 211]

A *Positive*
B *Negative*
C *Zero*
D *Anything is possible*

Q8. *According to the work–energy theorem, what happens to the kinetic energy of an object when positive net work is done on it?* [Final 232]

A *It decreases.*
B *It remains constant.*
C *It increases.*
D *It becomes zero.*

Q9. *A 300 kg horse runs a distance of 60 m while a constant net force of 180 N acts on it in the direction of motion. If its final speed is 10 m/s, what was its initial speed?* [Final 202]

A *28 m/s*
B *5.3 m/s*
C *0.632 m/s*
D *2 m/s*

Q10. *A force changes the speed of a 20 kg object from 2 m/s to 5 m/s. Find the work done on the object.* [Final 221]

A *210 J*
B *30 J*
C *420 J*
D *600 J*

7.3 Work Done by the Gravitational Force

Q11. *A 35 kg object is lifted vertically through a height of 1.0 m at constant speed. How much work is done by the lifting force?* [Final 231]

A *35 J*
B *36 J*
C *100 J*
D *343 J*

Q12. *A 75 kg box is lifted 2.5 m above its initial height. How much work is done by gravity?* [Final 241]

A *−1839 J*
B *0 J*
C *−736 J*
D *−187.5 J*

Q13. *A hill is 100 m long and makes an angle of 12° with the horizontal. As a 50 kg jogger runs DOWN the hill, how much work does gravity do on the jogger?* [Final 242]

A *10198 J*
B *0 J*
C *1088 J*
D *30178 J*

7.4 Work Done by a Spring Force

Q14. *The negative sign in Hooke's law, $F_x = -kx$, indicates that:* [Final 231]

A *the spring force decreases as the stretch increases.*
B *the spring force increases as the stretch increases.*
C *the spring force is opposite to the displacement.*
D *the spring force is in the direction of the displacement.*

Q15. *A spring (k = 1200 N/m) is fixed to a wall at one end and pulled by a force of 84 N at the other end. By how much does it stretch?* [Final 211]

A *3.4 cm*
B *5.1 cm*
C *7 cm*
D *14.3 cm*

Q16. *When a spring is pulled by a 20 N force it stretches by x = 5 cm. What is the spring constant k?* [Final 241]

A *200 N/m*
B *1000 N/m*
C *800 N/m*
D *400 N/m*

Q17. *Stretching a spring by 0.30 m from its relaxed length requires 210 J of work. Calculate the spring constant.* [Final 222]

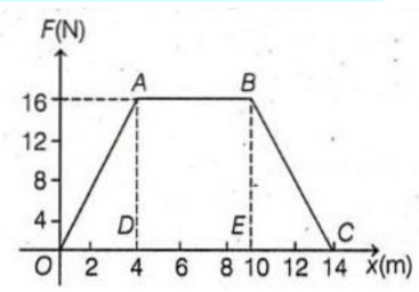
A *6000 N/m*
B *9.5 N/m*
C *4667 N/m*
D *2333 N/m*

Q18. *A spring with a force constant of 500 N/m is compressed by 0.2 m. What is the work done in compressing the spring?* [Final 232]

A *10 J*
B *50 J*
C *25 J*
D *100 J*

7.5 Work Done by a Variable Force

Q19. *The force acting on an object varies with its position along the x-axis as shown in the graph. How much work is done by this force as the object moves from x = 6 m to x = 14 m?* [Final 211]



A *96 J*
B *128 J*
C *160 J*
D *64 J*

7.6 Power

Q20. *The unit of power is:* [Final 222]

A *J/s*
B *Nm/s*
C *Both of the above*
D *None of the above*

Q21. *A machine delivers a power of 250 W during 2 minutes of operation. What is the work done by the machine during these 2 minutes?* [Final 202]

A *30000 J*
B *6.9 J*
C *69 J*
D *25 J*

Q22. *Calculate the power when a 20 N horizontal force pushes a cart 3.5 m horizontally in 0.5 s.* [Final 211]

A *70 W*
B *35 W*
C *11.4 W*
D *140 W*

Q23. *A car's engine generates 100,000 W of power as it exerts a force of 10,000 N. How long does it take the car to travel 100 m?* [Final 221]

A *0.001 s*
B *0.01 s*
C *1000 s*
D *10 s*

Q24. *A 1400 kg car is to increase its speed from 10 m/s to 25 m/s in 5 seconds. How much engine power is required?* [Final 182]

A *73.5 kW*
B *4.2 kW*
C *63 kW*
D *105 kW*

Q25. *How much power is required to increase the speed of a 1400 kg car from 8 m/s to 19 m/s in 5 seconds?* [Final 202]

A *41580 W*
B *1540 W*
C *83160 W*
D *20790 W*

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