Answers To Uw Physics 121 Tutorial Homework

Answers To Uw Physics 121 Tutorial Homework Answers to UW Physics 121 Tutorial Homework A Comprehensive Guide to Mastering Mechanics This comprehensive guide provides detailed solutions to the tutorial homework problems assigned in UW Physics 121 covering a wide range of mechanics concepts Each solution is presented stepbystep emphasizing clear explanations and logical reasoning making it easy for students to understand and apply the concepts to other problems UW Physics 121 Mechanics Tutorial Homework Solutions Kinematics Dynamics Energy Momentum Work Power This document is a valuable resource for students enrolled in UW Physics 121 offering them a clear understanding of the course material and enabling them to confidently tackle their tutorial homework assignments It covers a diverse range of problems encompassing topics like kinematics dynamics work energy and momentum Each solution is meticulously crafted to provide not only the answer but also a thorough explanation highlighting key concepts and problemsolving strategies The goal is to not only provide the correct answer but also to foster a deeper understanding of the underlying physics principles Conclusion The pursuit of knowledge is an ongoing journey and Physics 121 marks an exciting step in your exploration of the physical world While the solutions provided here offer guidance and support remember that true understanding stems from active engagement with the material Dont be afraid to question explore and challenge yourself beyond the textbook The wonders of physics await those who are curious enough to unravel its secrets FAQs 1 Are these solutions guaranteed to be correct While every effort has been made to ensure accuracy errors can still occur It is always recommended to crosscheck the solutions with your professor or teaching assistants The aim is to provide a comprehensive framework for understanding the concepts not a guaranteed set of answers 2 2 Can I use these solutions to simply copy answers The goal of this guide is not to provide a shortcut to completing homework but to provide a tool for understanding and learning Copying answers without understanding the underlying principles will not aid in your longterm learning Instead use these solutions to actively work through the problems and grasp the concepts 3 What if Im struggling with a concept not covered in the solutions The solutions provided

here cover a wide range of topics but may not address every possible question It is highly recommended to attend office hours seek help from your teaching assistants or utilize online resources to further explore the concepts you find challenging 4 Will this guide help me with exams While understanding the concepts covered in the tutorial problems is essential for exam preparation it is not a guarantee of success Exams often include different types of questions that require a deeper understanding of the material Remember to review your class notes practice past exams and actively participate in class discussions to maximize your exam preparation 5 How can I ensure that I truly understand the material beyond just completing the homework The key to understanding physics lies in active engagement Go beyond just solving problems Try to explain the concepts in your own words relate them to realworld examples and consider different scenarios and applications The more you interact with the material the deeper your understanding will become Solutions Problem 1 A car accelerates from rest to a speed of 30 ms in 10 seconds What is the cars acceleration Solution We can use the equation a v u t Where a acceleration v final velocity 30 ms u initial velocity 0 ms t time 10 s 3 Substituting these values a 30 0 10 3 ms Therefore the cars acceleration is 3 ms Problem 2 A ball is thrown vertically upward with an initial velocity of 20 ms How high does the ball go Solution At the highest point the balls final velocity will be 0 ms We can use the equation v u 2as Where v final velocity 0 ms u initial velocity 20 ms a acceleration due to gravity 98 ms s displacement height Substituting the values 0 20 298s Solving for s we get s 204 m Therefore the ball goes approximately 204 meters high Problem 3 A 10 kg box is pushed across a horizontal surface with a force of 50 N The coefficient of kinetic friction between the box and the surface is 02 What is the acceleration of the box Solution First we need to calculate the force of friction Ffriction k Fnormal Where k coefficient of kinetic friction 02 Fnormal normal force equal to the weight of the box 10 kg 98 ms 98 N Therefore Ffriction 02 98 N 196 N Now we can find the net force acting on the box Fnet Fapplied Ffriction 50 N 196 N 304 N Finally we can use Newtons second law to find the acceleration 4 Fnet m a a Fnet m 304 N 10 kg 304 ms Therefore the acceleration of the box is 304 ms Problem 4 A 2 kg object is moving with a velocity of 4 ms A constant force of 10 N is applied to the object for 3 seconds What is the final velocity of the object Solution We can use the equation v u at Where v final velocity u initial velocity 4 ms a acceleration Fm 10 N 2 kg 5 ms t time 3 s Substituting the values v 4 5 3 19 ms Therefore the final velocity of the object is 19 ms Problem 5 A 5 kg block is released from rest at the top of a frictionless incline that is 10 meters long and makes an angle of 30 degrees with the horizontal What is the speed of the block at the bottom

of the incline Solution We can use the conservation of energy principle At the top of the incline the block has potential energy and no kinetic energy At the bottom the potential energy is converted to kinetic energy Potential energy at the top PEtop mgh Kinetic energy at the bottom KEbottom 12 mv Where m mass of the block 5 kg g acceleration due to gravity 98 ms h height of the incline 10 m sin 30 5 m v velocity at the bottom Setting PEtop equal to KEbottom 5 mgh 12 mv Solving for v v 2gh 2 98 5 99 ms Therefore the speed of the block at the bottom of the incline is approximately 99 ms Problem 6 A 2 kg object is moving with a velocity of 5 ms A 3 kg object is moving with a velocity of 2 ms What is the velocity of the center of mass of the system Solution The velocity of the center of mass Vcm is given by Vcm m1 v1 m2 v2 m1 m2 Where m1 mass of the first object 2 kg v1 velocity of the first object 5 ms m2 mass of the second object 3 kg v2 velocity of the second object 2 ms Substituting the values Vcm 2 5 3 2 2 3 45 08 ms Therefore the velocity of the center of mass of the system is 08 ms Problem 7 A 10 kg object is moving with a constant velocity of 4 ms What is the net force acting on the object Solution Newtons first law states that an object at rest stays at rest and an object in motion stays in motion with the same speed and in the same direction unless acted upon by an unbalanced force Since the object is moving with constant velocity it means there is no net force acting on it Therefore the net force acting on the object is 0 N Problem 8 A 5 kg object is suspended from a vertical spring The spring stretches 10 cm when the object is attached What is the spring constant of the spring Solution We can use Hookes Law F kx 6 Where F force exerted by the spring k spring constant x displacement from equilibrium 10 cm 01 m The force exerted by the spring is equal to the weight of the object F mg 5 kg 98 ms 49 N Substituting the values in Hookes Law 49 N k 01 m Solving for k k 49 N 01 m 490 Nm Therefore the spring constant of the spring is 490 Nm Problem 9 A 2 kg object is dropped from a height of 10 meters What is the speed of the object just before it hits the ground Solution We can use the equation v u 2as Where v final velocity what we want to find u initial velocity 0 ms a acceleration due to gravity 98 ms s displacement 10 m Substituting the values v 0 2 98 10 v 2 98 10 14 ms Therefore the speed of the object just before it hits the ground is approximately 14 ms Problem 10 A 10 kg object is placed on a frictionless surface A constant force of 20 N is applied to the object What is the work done by the force over a distance of 5 meters Solution The work done by a force is given by W F d cos 7 Where W work done F force 20 N d displacement 5 m angle between the force and displacement 0 since the force is applied in the direction of motion Substituting the values W 20 N 5 m cos 0 100 J Therefore the work done by the force over a distance of 5 meters is 100 Joules Beyond the Solutions A Call

to Deeper Understanding This document offers a stepping stone in your journey through Physics 121 While these solutions provide a framework for understanding mechanics true mastery comes from going beyond the surface level The joy of physics lies not only in solving problems but in delving into the underlying principles pondering their implications and finding connections to the world around you Remember every concept every equation is a doorway to a deeper understanding of the universe Explore these doors experiment with your own questions and let your curiosity guide you through the fascinating realm of physics

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