

# Gravitational Force and Orbits

Name:

<http://phet.colorado.edu>

## Part I – Gravity Force Lab: Basics

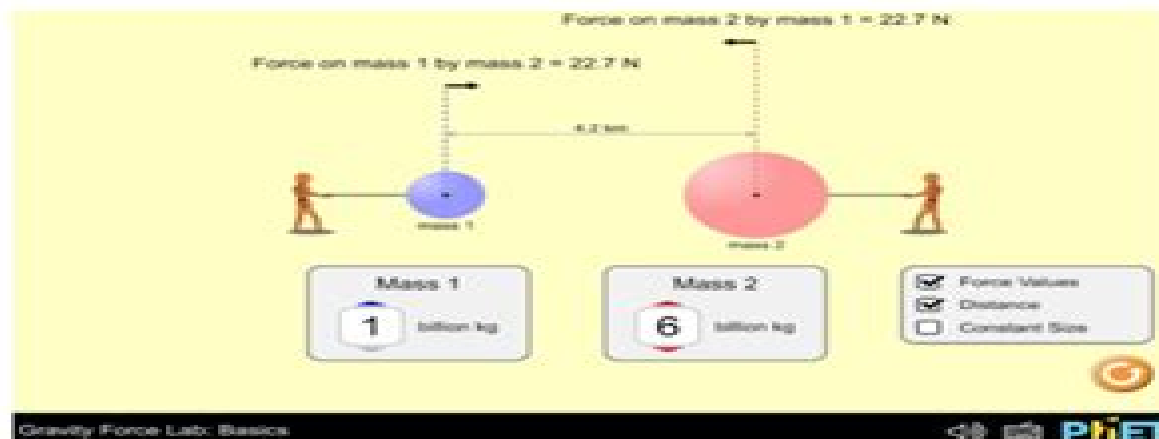
Use the relationship for The Law of Universal Gravitation and the PhET simulation, Gravity Force Lab: Basics

to determine the Universal Gravitational Constant, G.

$$F_g = \frac{G m_1 m_2}{r^2}$$

and compare to the published value.

**Note: Billion Kg =  $1 \times 10^9$  Kg and 1 Km = 1,000 m. Make sure all of your base units are m for distance and Kg for mass.**



Yes, we already know what this constant is, but let's see how close you can get to the known value of  $6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$ .

Select different masses, distances and record the force. Then calculate the average G value

Trial #	Mass 1 (billions of Kg)	Mass 2 (billions of Kg)	Distance (Km)	Force (N)	Gravitation Constant, G (Nm <sup>2</sup> /kg <sup>2</sup> )
1					
2					
3					
4					
5					
6					

# Gravitational Force Lab Colorado Answers

**Sabine Zange**



## Gravitational Force Lab Colorado Answers:

**New Challenges and Opportunities in Physics Education** Marilena Streit-Bianchi, Marisa Michelini, Walter Bonivento, Matteo Tiveri, 2023-10-30 This book is invaluable for teachers and students in high school and junior college who struggle to understand the principles of modern physics and incorporate scientific methods in their lessons It provides interactive and multidisciplinary approaches that will help prepare present and future generations to face the technological and social challenges they will face Rather than using a unidirectional didactic approach the authors scientists philosophers communication experts science historians and science education innovators divide the book into two parts the first part Communicating Contemporary Physics examines how new physics developments affect modern culture while the second part Digital Challenges for Physics Learning covers physics education research using ICT plus the experiences of classroom teachers and a range of ideas and projects to innovate physics and STEM teaching *Student Lab Manual for Argument-Driven Inquiry in Physical Science* Jonathon Grooms, Patrick J. Enderle, Todd Hutner, Victor Sampson , 2016-10-01 Are you interested in using argument driven inquiry for middle school lab instruction but just aren't sure how to do it Argument Driven Inquiry in Physical Science will provide you with both the information and instructional materials you need to start using this method right away The book is a one stop source of expertise advice and investigations to help physical science students work the way scientists do Student Lab Manual for Argument Driven Inquiry in Life Science provides the student materials you need to guide your students through these investigations With lab details student handouts and safety information your students will be ready to start investigating *Argument-Driven Inquiry in Physical Science* Jonathon Grooms, Patrick J. Enderle, Todd Hutner, Ashley Murphy, Victor Sampson , 2016-10-01 Are you interested in using argument driven inquiry for middle school lab instruction but just aren't sure how to do it Argument Driven Inquiry in Physical Science will provide you with both the information and instructional materials you need to start using this method right away The book is a one stop source of expertise advice and investigations to help physical science students work the way scientists do The book is divided into two basic parts 1 An introduction to the stages of argument driven inquiry from question identification data analysis and argument development and evaluation to double blind peer review and report revision 2 A well organized series of 22 field tested labs designed to be much more authentic for instruction than traditional laboratory activities The labs cover four core ideas in physical science matter motion and forces energy and waves Students dig into important content and learn scientific practices as they figure out everything from how thermal energy works to what could make an action figure jump higher The authors are veteran teachers who know your time constraints so they designed the book with easy to use reproducible student pages teacher notes and checkout questions The labs also support today's standards and will help your students learn the core ideas crosscutting concepts and scientific practices found in the Next Generation Science Standards In addition the authors offer ways for students to develop the disciplinary skills outlined in the

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*EduGorilla's CBSE Class 12th Physics Lab Manual | 2024 Edition | A Well Illustrated, Complete Lab Activity book with Separate FAQs for Viva Voce Examination* EduGorilla Prep Experts, **Fun Physics Projects for Tomorrow's Rocket Scientists : A Thames and Kosmos Book** Alan Gleue,2012-12-12 Learn about physics with fun projects and experiments Created in partnership with Thames Kosmos Fun Physics Projects for Tomorrow s Rocket Scientists introduces you to essential physics concepts through do it yourself projects that you can then use to perform experiments Experience the thrill of scientific discovery when you observe the physics of motion including constant speed acceleration and free fall through your own experiments All of the projects use inexpensive readily available materials and software No experience required Chapters feature Things You ll Need lists of all the components and equipment required for each project Be Careful important safety tips Famous Scientists introductions to people who ve made significant contributions to our understanding of physics Online Videos link to the author s demonstrations of the projects Step by step projects include Constant speed vehicle Uniform acceleration fan car Tennis ball cannon to investigate speed and study free fall Trebuchet for observing the force of weight Projectile motion catapult Water rocket to demonstrate Newton s Laws of Motion Mousetrap powered car that displays energy transformations Model rocket engine to calculate momentum and impulse Rocket launch ignition system and launch pad Cool model rockets that demonstrate acceleration speed and altitude **AFOSR**. United States. Air Force. Office of Scientific Research,1968 **Forces and Motion** LernerClassroom Editors,2008-01-01 FUERZAS Y MOVIMIENTO FORCES AND MOTION TEACHING GUIDE Current Programs ,1974 *Intermediate Dynamics* Patrick Hamill,2010 Intended for the two semester upper division undergraduate Classical Mechanics course Intermediate Dynamics provides a student friendly approach The text begins with an optional review of elementary physical concepts and continues to an in depth study of mechanics Each chapter includes numerous accessible exercises that help students review and understand key material while rigorous end of chapter problems challenge students to find solutions based on concepts discussed in the chapter Additional computer problems are offered at the end of each chapter for those who would like to utilize numerical techniques **Instruments; the Magazine of Measurement and Control** ,1968 *Scientific and Technical Aerospace Reports* ,1995 Energy Insider ,1980 **U.S. Government Research Reports** ,1963 **Passive Restraint Systems; a Bibliography** Lois Flynn,1978 **A Subject Bibliography from Highway Safety Literature** United States. National Highway Traffic Safety Administration,1978 Journal of Chemical Education ,1926 Includes Report of New England Association of Chemistry Teachers and Proceedings of the Pacific Southwest Association of Chemistry Teachers Ocean Disposal of Unserviceable Chemical Munitions United States. Congress. House. Committee on Merchant Marine and

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