
It is a truism in physics that one never really understands anything until one tries to explain it to someone else.

Instructor: Mike Crivello
Office: MS-115L
Office Hours: To be Announced - Online via Zoom

Mailbox: MC-215 (located above the Mesa Cafeteria)
e-mail: mcrivell@sdccd.edu

COURSE TITLE: Mechanics

PREREQUISITE: Math 150 (Calculus 1) with a grade of 'C' or better, or equivalent. Although this is a calculus-based course, much of what we do depends only on the extensive use of algebra and trigonometry. Thus, you will need to know Algebra and Trig like the back of your hand. You must know that $\cos 30^\circ$ is $\sqrt{3}/2$ and that $\sin 30^\circ$ is $1/2$ without turning on your calculator. You also must know how to recognize and solve a quadratic equation. Please find a *quadratic equation solver program* for your calculator. Don't wait until the last minute!

ADVISORY: Completion of or concurrent enrollment in MATH 151 with a grade of "C" or better, or equivalent.

NOTE: You will be expected to understand verbal instructions during lecture and in lab. Failure to understand verbal instructions during the lab sessions is a safety hazard to you and your classmates.

CRNs: This syllabus is for the following class numbers: 53304 and 53305.

REQUIRED MATERIALS:

1. Web-based eText: Fundamentals of Physics, Volume 1, Halliday & Resnick, 10th Edition, 2014, Wiley Publishers. This is packaged **ONLY** in the Mesa College bookstore as an ACCESS CARD code. This code will enable you to access our course's online WileyPlus homework, as well as the entire eBook and our course materials. (**Note: I strongly recommend that you have a printed hard-copy of our textbook. You can purchase the previous 9th or 8th edition online for less than \$30.**)
2. Login to the Wiley site ***listed on the last page of this syllabus***, www.wileyplus.com/go/login, and use your ACCESS CARD code purchased in the Mesa bookstore to register using our Course Section ID **A40134**.
3. Lab Packet for P195-Crivello: only found in Mesa Bookstore.
4. Scientific calculator (Personally I like the old Hewlett Packard HP-48).
5. 12-inch ruler and protractor.
6. Pentel® Quicker-Clicker™ Mechanical Pencil, 0.5 millimeter, is highly suggested, as it is always sharp!

**** For Item #1 Above: You can access our course NOW using a Free 14-day Grace Period, but please purchase this ACCESS CARD from the Mesa College Bookstore by the 2nd week of the semester. Please make a copy of your bookstore receipt AND the Access Code for your files, as Wiley tech support may ask for them if you contact Wiley for tech support.**

Welcome to Physics 195 Mechanics! I sincerely hope that you will enjoy this course as you begin your study of Physics. Although we will not have the opportunity to meet in person, I look forward to meeting you all on our weekly Zoom meetings. Please do not lose this syllabus. It has all the information concerning grading policy

and course content. Keep it with you throughout the semester. Please do not lose this syllabus. It has all the information concerning grading policy and course content. Keep it with you throughout the semester.

COURSE DESCRIPTION: This 5-unit course is designed to give a foundation in calculus-based physics for engineering and science majors. Physics 195 deals primarily with the description of motion and its causes, and energy transfer processes.

SYNOPSIS OF THIS COURSE: The study of physics is considered the center of modern science. It is the most elegant and fundamental of all the sciences. Many of the laws of physics we will learn are centuries old. However, scientists and engineers use these laws today to perform such feats as landing a vehicle on the surface of Mars, and designing the circuits inside your graphing calculator and cell phone.

STUDENT LEARNING OUTCOMES AND COURSE OBJECTIVES:

Critical Thinking: Students will display the ability to use proportional reasoning and graphical analysis to establish and analyze relationships between measured quantities.

Communication: Students will display the ability to clearly communicate scientific principles, experimental results, and their implications.

Problem Solving: Students will display the ability to apply conceptual and mathematical tools to correctly predict the future state of physical systems.

In addition, upon successful completion of this course, you should have proficiency in the understanding and application of physical concepts in the area of Mechanics. This can include, but is not limited to, the concepts of kinematics, Newton's Laws of Motion, rotational and oscillatory motion, conservation laws for energy and momentum, fluids, wave motion, heat and thermodynamics.

Since these skills are essential for your success in subsequent physical science courses, you will be expected to demonstrate your knowledge and mastery of these physical principles by:

- Applying the basic kinematic equations in order to understand and predict the motion of a body or system.
- Identifying and analyzing forces and torques acting on body or system.
- Using conservation laws for energy and linear/angular momentum to predict and analyze the physical properties of a system.
- Applying your knowledge of algebra, trigonometry, and calculus to analyze and solve physics problems.
- Applying physics theory learned in lecture to predict and carry out laboratory experiments in physics.

COURSE CONTENT: The topics covered in this course are designed to give the future scientist or engineer (you the student) a solid foundation in Mechanics, the most fundamental area of physics. The course schedule located at the end of this syllabus lists the topics covered in each week of instruction.

Course Emphasis:

The emphasis of this course is to develop and refine your skills as a problem solver while learning and understanding (and enjoying!) physics. Why? Because as a scientist or engineer, you will be hired *and paid* to solve problems. Real problems. For example: how can we make this CPU run faster (and cooler...), how can we build a more efficient engine, why did this bridge collapse, how can we make a faster 1TB iPhone for under \$49 with a battery life of 2 weeks, ...?

You will learn the connection between calculus and physics through extensive problem solving. You will be amazed at the number of times you will be saying to yourself throughout this course “oh that’s what this meant in calculus class!” You will incorporate your understanding of calculus into your understanding of physics. I feel it is important for you to understand the concepts. Just because your answer matches the answer in the back of the book does not necessarily mean that you have understood the problem.

A Recipe for Success:

Success in this course requires a huge time commitment on your part. It takes **time** (and patience) to learn and understand physics. Physics is not a spectator sport. It requires the utmost concentration and participation. You should expect to spend at least 2 hours outside of class for every hour video of lecture. This translates to more than 12 hours of reading the textbook (yes, you will really have to *read* the textbook and take active notes while reading the textbook), reviewing and rewriting your notes, working problems, working on lab reports, and studying for exams. Please take pride in every assignment. Your work is a direct reflection of you and your attitude toward your college education and success. Thus, please write neatly and be organized. Successful students tend to take pride in their work and will produce neat and organized assignments (as if you were giving it to a prospective employer along with your résumé). I may choose not to grade sloppy, messy, and/or disorganized work. This means that if your handwriting is usually sloppy, then you will have to work harder to make your work look neat. This will soon become habit and perhaps increase your performance in your other classes. **The time that you invest into your college studies now can be the best investment choice in your life.**

The study of Physics is an empirical science. Thus, it is a **laboratory**-oriented subject. Since we cannot meet on campus for the lab, we will be exploring topics in experimental physics remotely.

"You can observe a lot just by watching"- Y. Berra

Exams and Grading: Our Exams are given during the scheduled class time of 11:10am to 1:15pm on a Tuesday or a Thursday. The tentative dates are listed near the end of this syllabus. I will announce the exact date of each exam at least one week ahead of time. If you work during the day, you will need to arrange your schedule so that you are at your computer at these times to take the exams. There will be a total of four closed-book exams and a cumulative final exam.

There will be no make-up exams, however, I will drop your lowest exam score*. This means that your course grade is based on the scores of your *best three out of the four exams*. I have posted an equation sheet on our class website. You will need to print this out and have it in front of you during our online exams. This list of equations will also be on the front page of each exam. You will be allowed to use your computer and your calculator during the exam, but you will not be allowed to use any other devices such as your phone. You really need to purchase a hand-held calculator. The grading scale will be as follows:

Exams (best 3 out of 4)	45% (*You MUST take exam #1, or you could be dropped from the course)
Final Exam (cumulative)	15%
Lab session work	20%
<u>Homework & Assignments</u>	<u>20%</u>
Total	100%

Please make a copy of every lab assignment you turn in and keep all graded work during the semester.

Your final course letter grade will be determined as follows:

90 to 100%	→ A**
80 to 89%	→ B**
70 to 79%	→ C**
51 to 69%	→ D**
Under 51%	→ F

*Note: The instructor has the right to change the above grading criteria if the semester is interrupted by national or local emergencies.



Policy Regarding Late Work:

I believe in Bigfoot, the Easter Bunny, and the Tooth Fairy. However, there is *no such thing* as LATE WORK or MAKE-UP EXAMS. They don't exist! They are a myth. Completing assignments **when they are due** is part of the assignment. You either did the assignment or you didn't. You either were there to take the exam or you missed it. In today's job market, you will either be fired (or not hired in the first place) for showing up late or not completing a task on time. It is important to learn organizational skills early in your career if you have not already done so. With that said, all homework assignments are on the WileyPlus site and have specific due dates and times. It is your responsibility as a student to know the due dates for each assignment.

Homework: Many students say that I assign toooooo much homework. I agree. I wish I could just assign one problem per chapter and be done with it. Unfortunately, just as you cannot learn to play the guitar by plucking one string each week, you cannot learn physics by solving one homework problem each week. It takes practice! One semester I tried assigning NO HOMEWORK. Can you guess what happened? That's right! Many students chose not to study at all and failed miserably. However, the serious students worked on and solved the suggested homework problems, showed up for every class session, and succeeded in the course. With that said, I will regularly assign homework questions from the text. You will complete them via the WileyPlus website. I really expect you to solve these problems, and to provide a little motivation they will be counted toward your final grade. I will often post videos on our class site that explain in detail some of the homework problems. Feel free to ask questions about them in our Zoom office hours. These problems are chosen to increase your understanding of certain concepts and important course content. Many of the exam questions will be based upon material typically assigned as homework.

You should approach every homework or exam problem as you would any other problem in life: with a positive attitude. You will have fun learning physics and solving problems if you see all of this as a challenge and opportunity, and not an obstacle.

Attendance and add/drop policy: It is important that you keep up with the course material. There is a lot to cover. If you wish to drop yourself from the class, don't forget to do that by the April 16, 2021 deadline, otherwise a letter grade (A through F) must be issued to you. It is *your responsibility* to add, drop, or withdraw from all classes in which you are no longer attending. It is my discretion to withdraw students not participating in class before the add/drop deadline of April 16, 2021. Students who remain enrolled in a class beyond April 16, 2021, will receive an evaluative letter grade in this class. Reference: Mesa College Class Attendance Policy.

*****NOTE***:** At the end of the semester when I submit grades to the District, I am required to submit a student's "Date of Last Activity" if they have earned a non-passing grade. The last day to drop the course is April 16, 2021. If, after the April 16 drop deadline, you are no longer logging in to our class site to submit assignments and are no longer taking our exams, but then you login on the *last* day of the semester to take our last exam, the District will not recognize that as your "last day of activity", and I am required to enter the previous date of known activity. Your extended absence in the class could have an impact if you are receiving financial aid.

REFUNDS \$\$\$: The last day to apply for a refund for enrollment fees and/or nonresident tuition is ***February 16, 2021.***

Please verify all deadline dates with the College Admissions office.

Academic Integrity: This class will be conducted in accordance with the Mesa College student code of conduct and basic standards of academic honesty. Cheating, plagiarism, and other forms of academic dishonesty are not acceptable and will not be tolerated. Cheating includes, but is not limited to the following: using your phone during an exam, using a second computer to access information during an exam, opening another browser window during an exam, navigating away from the exam window during an exam, presenting someone else's work as your own (**do not** copy from your lab partner!!!), using notes of any form on the exam which are not allowed, communicating with another student during an exam, discussing the exam with another student who has yet to take the exam, giving your lab report to another student for them to copy. If you are found cheating you could receive a grade of **F** for the course. In addition, violations of standards of academic honesty may be reported to the college disciplinary office for appropriate action. If you are found to have violated this policy during an exam, you will receive a zero for that exam, and that exam will **not** be dropped from your course grade.

\$\$ Having a case of academic dishonesty on your school record could prevent you from being accepted into a university and could severely impact your ability to earn a living in the future. \$\$

Since we are all responsible adults, I do not expect this matter to be an issue in this course.

The student Code of Conduct, disciplinary procedure, and student due process (Policy 3100,3100.1 and 3100.2) can be found in the current college catalog in the section Academic Information and Regulations pages 39-51, and at the office of the Dean of Student Affairs (i4-408).

Accommodation of Disability: If you have a disability (medical, physical, or academic) and need academic accommodations, please notify me as soon as possible.

Your Responsibilities as a Student:

You are expected to read the assigned sections in the text and attempt to work the assigned problems pertaining to each section before it is covered in the course. This will familiarize you with the material. It's okay if you do not fully grasp the content at first reading. You will find that you understand the lecture material much better after going through the text and problems first on your own.

Homework: accessed on the WileyPlus website.

Your WileyPlus homework assignments are found on the WileyPlus website. You will **NOT** be handing in your written work. However, in past semesters, I have suggested to students that they structure their homework problems using the following format. This will help you to be organized. If your homework is first written in this format when solving the problems on the WileyPlus site, you will have a permanent written record to assist you in studying for exams.

Suggested procedures: (Note: I have included samples of this format toward the end of this syllabus.)

1. Only one problem per page. This means that if I assign 15 homework problems, you would have at least 15 pages (or more if they include many parts a, b, c, d, etc.).
2. Use 8 ½ X 11-inch paper. Suggestion: Blank, white, printer paper provides you a clean slate in which to draw your diagrams.
3. Please do **NOT** write out the entire word problem from the text. Follow my example in the syllabus.
4. Chapter and problem # in an upper right-hand corner box for each page. You can download the homework template on our class website if you wish.
5. Use only one side of the paper. (Refer to #1 from above.)

6. Separate parts a, b, c,... etc. with a horizontal line. If part 'c' will not fit, put it on a new sheet of paper. Thus, a longer problem comprised of parts 'a', 'b', and 'c', may only have parts 'a' and 'b' on one sheet of paper, and then part 'c' on another separate sheet of paper, for a total of two sheets of paper.
7. Put the answer in a vertical column on the right-hand side of each page, across from your final worked step.
8. Show physics equations, then substitution of quantities with units, showing proper cancellation of units.
9. Please keep the problems in order for later reference. .
10. You may find yourself referring to these problems later in your academic career.

Believe it or not, when your homework is *this* neat and organized, it will be much easier to review for exams using your old homework assignments.

Toward the end of this syllabus I have also included a sample of the same homework problem worked by two different students. One of them is done in a step-by-step manner using the format outlined above. The other is incomplete, carelessly drawn, and lacking organization and detail.



Global Warming Alert: Some students feel that they will be 'wasting' too much paper over the course of the semester and would rather cram all 15 homework problems onto one sheet of paper using very tiny print. Let not your heart be troubled! You will not be 'wasting' paper using the suggested homework format. You will be 'using' paper to build and refine your organizational, diagrammatical, and problem-solving skills, resulting in a finished, professional product that is readable by you, me, and your classmates. These organizational skills will help you be employable as a working professional and allow you to afford a standard of living that includes expensive energy saving and environmentally friendly 'green' technologies in your future home such as solar, electric/hybrid, and high-tech high-efficiency composite building materials.

Resources: (where to get more help!)

If you are having difficulties in the course, or would just like additional resources, there are many options available to you here on campus. The Mesa Tutoring and Computing Centers (MT2C), located in the LRC (library!), now provide online tutoring in a variety of subjects for all Mesa College students. Tutoring in physics courses is available during most of the Tutoring Center hours. Trained peer tutors and faculty volunteers provide tutoring. To use the tutoring center, you may be required to enroll in a zero-unit course in supervised tutoring. Tutoring subjects are listed in the course schedule of classes under Tutoring.

More help for the Student:

Additional Resources:

0. **THE BEST:** <https://www.youtube.com/c/Flippingphysics2013/featured> , just enter your search topic ("motion", "projectile motion", ...etc.)

1. The WileyPlus website for our Halliday textbook.
2. The Khan Academy - <https://www.khanacademy.org/science/physics>
3. *Physics for Scientists and Engineers*, by R. Serway
4. *Portable TA: A Physics Problem Solving Guide, Volume I (Paperback)*, A. Elby
5. Schaum's Outline series for various levels of physics, McGraw-Hill. You can find some of these on-line via the Mesa College library web site!
6. *Physics*, by John D. Cutnell and Kenneth W. Johnson. This is an algebra/trig-based book that may be easier to read.

You can find these books in their current or older edition online or your local public library.

7. <http://hyperphysics.phy-astr.gsu.edu/hbase/hph.html>

8. <http://phet.colorado.edu>

The WileyPlus website (#1) is designed to help you review key concepts from the textbook through interactive exercises and learning tools.

What it takes to be successful in this class:

Some students learn by listening, some learn by writing, and some learn by a combination of these and other methods of processing information. One of the best strategies for familiarizing yourself with the material is to do the following:

1. Take notes as you read the textbook.
2. Watch our lecture videos. If you have already done step 1, then you will find that it is easier to understand and listen during the videos, as the material will be familiar to you.
3. Re-writing the class notes reinforces the material, familiarizes you with important concepts, and helps build muscle memory (hand to brain) from repetitiously using/writing physics expressions and equations.
4. After you have re-written your notes, you may find that re-writing them *again* helps familiarize yourself with the subject and its contents and nuances.
5. If you come to me and ask “what can I do to study for the course?”, I will ask to see written evidence that you have tried the above steps of writing and re-writing your notes.
6. Many of the homework problems are similar to the example problems covered in the lecture session. If you ask me about a homework problem that is similar to one that we have already done in the lecture videos, I will ask you if you have referenced those, and then I will ask you to find that similar problem our lecture notes.

In closing, I wish you much success as you embark on one of the most rewarding challenges in your academic career: Physics!

You are responsible for keeping a record of your progress in the course.

Please use the tables below and the WileyPlus Gradebook to keep track of your graded work. This means that you can always calculate your present class grade. If you ask me “how am I doing in this class” or “what’s my grade so far”, I will refer you to this chart. **Please keep a copy of all work that is submitted.** In addition, please keep all graded assignments.

“A pessimist sees the difficulty in every opportunity; an optimist sees the opportunity in every difficulty.” - Winston Churchill

Score card:

Homework												

Lab #1	Lab #2	Lab #3	Lab #4	Lab #5	Lab #6	Lab #	Lab #			

Exam#1*	Exam#2	Exam#3	Exam#4

Use the grading scale from page 3 of this syllabus to calculate your score:

Exams (best 3 out of 4)	45%	(*You MUST take exam #1, or you could be dropped from the course)
Final Exam (cumulative)	15%	
Lab session work	20%	
<u>Homework & Assignments</u>	<u>20%</u>	
Total	100%	

Physics 195 Mechanics Crivello Mesa College Spring 2021

Tentative Course Schedule: I will announce any changes during class time.

<i>Week of</i>	<i>Week #</i>	<i>Topics</i>	<i>Chapter</i>
Feb 2,4	Week 1	Introduction, Units, Displacement, Speed, Velocity Acceleration, Equations of Motion	1,2
Feb 9,11	Week 2	Constant Acceleration, Bodies in Free Fall	2
Feb 16,18	Week 3	Vectors, Motion in 2-Dimensions, Projectile Motion	3,4
Feb 23,25	Week 4	Projectile Motion	4
Mar 2,4	Week 5	Tentative Date of Exam #1: March 4, 2021 11:10am – 1:15pm Relative Motion, Forces	4,5
Mar 9,11	Week 6	Forces, Newton's Laws of Motion	5
Mar 16,18	Week 7	Friction, Circular Motion	6
Mar 23,25	Week 8	Work and Energy	7
Mar 29 – Apr 3		Spring Break	
April 6,8	Week 9	Tentative Date of Exam #2: April 6, 2021 11:10am – 1:15pm Conservation of Energy	8
April 13,15	Week 10	Center-of-Mass, Momentum, Impulse, Collisions	9
April 20,22	Week 11	Rotational Kinematics	10
April 27,29	Week 12	Tentative Date of Exam #3: April 29, 2021 11:10am – 1:15pm Rotational Kinematics (Cont.)	10
May 4,6	Week 13	Rotational Dynamics, Rolling Motion, Torque	11
May 11,13	Week 14	The Vector Nature of Torque, Angular Momentum	11
May 18,20	Week 15	Tentative Date of Exam #4: May 20, 2021 11:10am – 1:15pm Simple Harmonic Motion (SHM), Oscillations, Pendulums	11, 15
May 25,27	Week 16	<i>Exact date of Final Exam: Thursday, May 27, 2021, at 11:10am. The Final exam will cover material from chapter 15 & the entire semester.</i>	15

Rev. 01/13/2021

Lab Logistics: Mesa College Physics

For repeated calculations for lab data: if you need to calculate $K = \frac{1}{2} mv^2$ seven times for a set of data, you may choose to show just *one* of these calculations to save space. The rest of these calculations can be done on your calculator without writing down the work.

Please make sure that everything on your paper is your own work. Do not copy from classmates, and do not let your classmates copy your lab, as you *BOTH* could receive a zero for that lab report. Please refer to our course syllabus on Mesa College's Policy on Academic Integrity.

I encourage you to form lab study groups and work together. However, please do all of your own calculations. In addition, do not rely on one classmate to do the group's calculations on their calculator. Now is the time to practice these skills on your own.

"Trust, but Verify" – Pres. Ronald Reagan

GRAPHING: There are several computer programs that can analyze a graph for you. However, you can gain a wealth of insight into your data (and physics!) if you know how to create a graph and analyze your data without the use of a computer. There may be times in your career when you will be asked to either create or interpret a graph in the field (or on an exam) by hand. For these reasons, you will be asked to plot and interpret all graphs by hand this semester. Aside: While you are acquiring data during the lab sessions, you may use your calculator to plot your data and find the slope in order to check if your results are reasonable before you graph it by hand.

CHECKLIST: Here is a brief checklist that will help you produce a quality lab.

- A. Refer to the '**How to Draw a Graph**' guide. This will remind you to label your axes, include proper units, and show your work in calculating slopes.
- B. Be sure to show your calculations (see Lab Logistic section above), including all physics equations used, along with **proper units** and their cancellation.
- C. Check for spelling and grammatical errors.
- D. Think about the purpose of the lab. Are your numerical results validating the physical principles investigated in the lab?
- E. Ask yourself, "Is *all* of this *my* original work (calculations and sentences)?" You will not have your lab partner with you for your first series of engineering job interviews, so you do not want to rely solely on your lab partner *now* for lab calculations and written explanations.

You are the only one who can decide how much you want to learn in your science courses.

Eventually, upon graduation from college, your depth of knowledge and your work habits will determine your standard of living for you and your (future) family. For some students it is difficult to see that the academic decisions you make *today* and in the coming college years will profoundly affect your quality of life and standard of living 5 to 75 years from now.

I want to thank you in advance for producing neat and organized work. Have a great semester!

Given: Stone thrown from top of building.

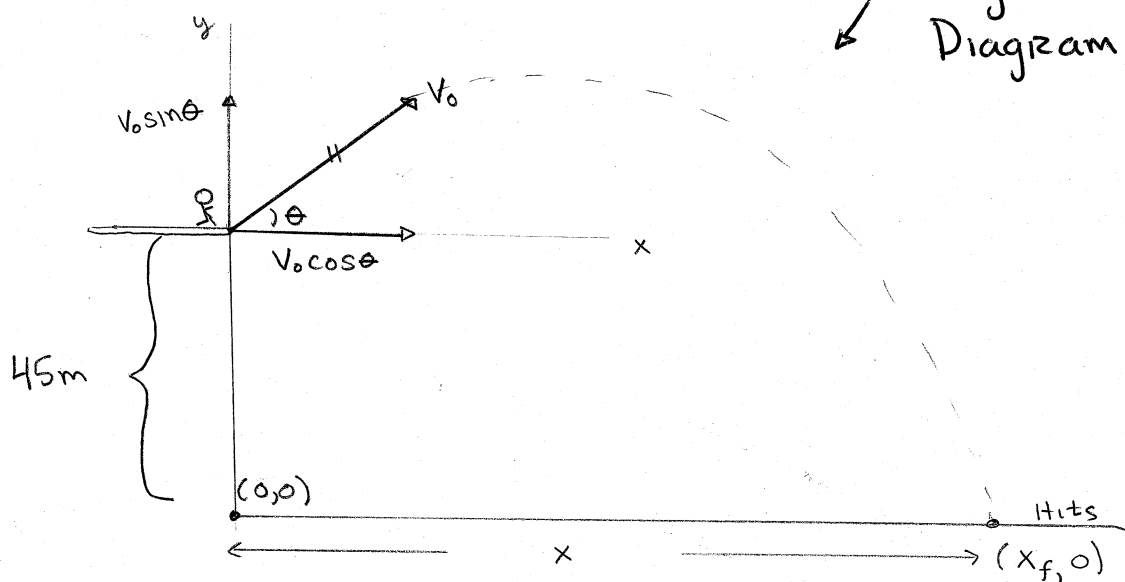
#38 Building Height is 45 m.

$$\theta = 30^\circ$$

$$V_0 = 20 \text{ m/s}$$

Given info

Large Diagram



work

a) How Long is stone in flight? $t = ?$

$$y_f(t) = y_0 + v_{oy}t + \frac{1}{2}a_y t^2$$

$$\text{but } a_y = -9.8 \text{ m/s}^2$$

$$v_{oy} = V_0 \sin \theta = 20 \text{ m/s} \sin 30^\circ = 10 \text{ m/s} = v_{oy} \quad y_0 = 45 \text{ m}$$

When it hits the ground, $y_f = 0$.

$$0 = 45 \text{ m} + 10 \text{ m/s} t + \frac{1}{2}(-9.8 \text{ m/s}^2) t^2$$

$$-4.9 t^2 - 10 t - 45 = 0$$

quad Eq: Use calculator

$$t = -2.18 \text{ s, OR } 4.22 \text{ sec}$$

can't be negative

$$\therefore t = 4.22 \text{ sec} \longrightarrow$$

Your Answer

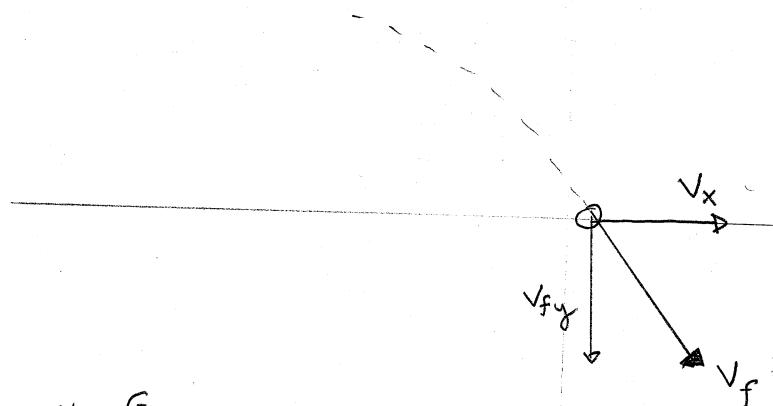
(a)

$$t = 4.22 \text{ se}$$

OVER

b) SPEED of stone as it hits the ground = ?
 $V_f = ?$ Note $V_{ox} = V_{fx} = V_o \cos 30^\circ$

4-38
cont



$$V_x = V_o \cos 30^\circ = 20 \text{ m/s} \frac{\sqrt{3}}{2}$$

$$V_x = 10\sqrt{3} \text{ m/s}$$

$$V_f = \sqrt{V_x^2 + V_{fy}^2} \quad \text{Pythagorean Th}^m.$$

\therefore Find V_{fy} :

$$V_{fy} = V_{oy} + a_y t = 10 \frac{\text{m}}{\text{s}} + (-9.8 \frac{\text{m}}{\text{s}^2})(4.22 \text{ sec})$$

$$\therefore V_{fy} = -31.4 \text{ m/s}$$

$$\therefore V_f = \sqrt{V_x^2 + V_y^2} = \sqrt{(10\sqrt{3})^2 \frac{\text{m}^2}{\text{s}^2} + (-31.4)^2 \frac{\text{m}^2}{\text{s}^2}}$$

$$V_f = 35.9 \text{ m/s}$$

★ separate parts b & c

Your Answer

(b) ↓

$$V_f = 35.9 \text{ m/s}$$

c) Where does it strike the ground? $X_f = ?$ ↑ with a LINE.

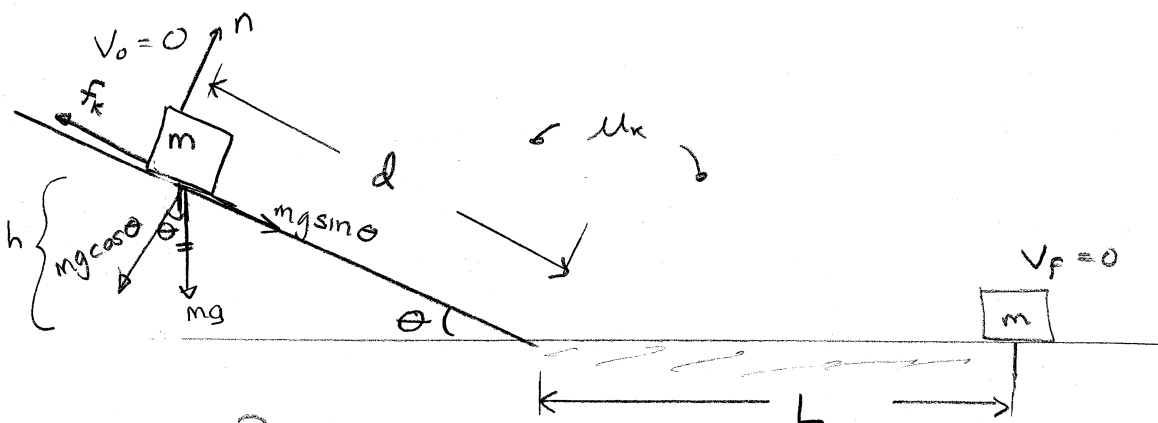
$$X_f = X_o + V_{ox} t + \frac{1}{2} a_x t^2 = 0 + V_o \cos \theta t = (20 \frac{\text{m}}{\text{s}})(\cos 30^\circ)(4.22 \text{ s})$$

$$X_f = 73 \text{ m}$$

(c)

$X_f = 73 \text{ m}$
from base of building.

#57) GIVEN $m = 10\text{kg}$ $d = 5\text{m}$ $V_f = 0$
 $\theta = 30^\circ$ $V_o = 0$
 $\mu_k = 0.15$ FIND L



a) $L = ?$

Using Consv of Energy

$$E_o - E_f = E_{\text{Lost}}$$

$$\sin \theta = \frac{h}{d}$$

$$h = d \sin \theta$$

$$mgh - 0 = f_k d + f_k L$$

$$mg d \sin \theta = (\mu_k mg \cos \theta) d + \mu_k mg L$$

$$L = \frac{d \sin \theta - \mu_k d \cos \theta}{\mu_k}$$

$$L = \frac{5\text{m} \sin 30^\circ - 0.15 (5\text{m}) \cos 30^\circ}{0.15} = 12.3\text{m}$$

(a)

$$\Rightarrow L = 12.3\text{m}$$

b) f_k on incline = ?

(b)

$$f_k = \mu_k n = \mu_k mg \cos \theta = (0.15)(10\text{kg})(9.8 \frac{\text{N}}{\text{kg}}) \cos 30^\circ = 12.7\text{N}$$

$$f_k = 12.7\text{N}$$



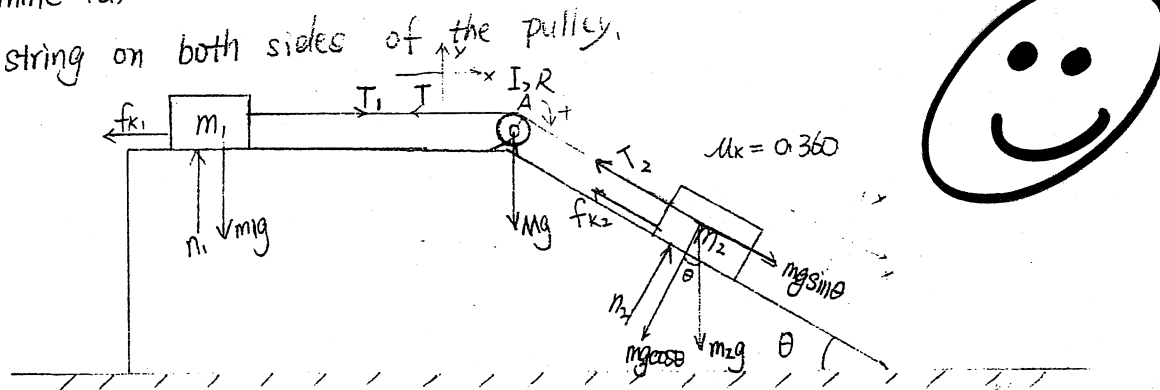
STUDENT SAMPLE: Good!

39. A block of mass $m_1 = 2.00 \text{ kg}$ and a block of mass $m_2 = 6.00 \text{ kg}$ are connected by a massless string over a pulley in the shape of a disk having radius $R = 0.250 \text{ m}$ and mass $M = 10.0 \text{ kg}$. These blocks are allowed to move on a fixed block-wedge of angle $\theta = 30.0^\circ$, as shown in Figure P10.39. The coefficient of kinetic friction for both blocks is 0.360 . Draw free-body diagrams of both blocks and of the pulley. Determine (a) the acceleration of the two blocks and (b) the tensions in the string on both sides of the pulley.

Chapter
10-39

* INSTRUCTOR
NOTE:

* This is
NOT necessary.



(a) Find a

#1) $\Sigma F_x = m_1 a$, $T_1 - f_{k1} = m_1 a$ but $f_{k1} = \mu_k n_1 = \mu_k m_1 g$

$$T_1 - \mu_k m_1 g = m_1 a \quad (1)$$

$$\Sigma \tau_A = I_A \alpha, \quad I_A = \frac{1}{2} M R^2$$

$$T_2 R - T_1 R = \frac{1}{2} M R^2 \alpha$$

And $a_{\text{cm}} = a_{\text{string}} = a_t = a = R \alpha \Rightarrow \alpha = \frac{a}{R}$

$$(T_2 - T_1) R = \frac{1}{2} M R^2 \left(\frac{a}{R} \right) \Rightarrow T = \frac{1}{2} M a$$

$$T_2 - T_1 = \frac{1}{2} M a \quad (2)$$

#2) $\Sigma F_x = m_2 a$

$$m_2 g \sin \theta - T_2 - f_{k2} = m_2 a$$

$$m_2 g \sin \theta - T_2 - \mu_k m_2 g \cos \theta = m_2 a \quad (3)$$

$$(1) + (3), \quad T_1 - T_2 + m_2 g \sin \theta - \mu_k m_1 g - \mu_k m_2 g \cos \theta = (m_1 + m_2) a \quad (4)$$

Sub (2) into (4),

$$m_2 g \sin \theta - \mu_k m_1 g - \mu_k m_2 g \cos \theta = (m_1 + m_2 + \frac{1}{2} M) a$$

$$\therefore a = \frac{m_2 g \sin 30.0^\circ - \mu_k m_1 g - \mu_k m_2 g \cos 30.0^\circ}{m_1 + m_2 + \frac{1}{2} M}$$

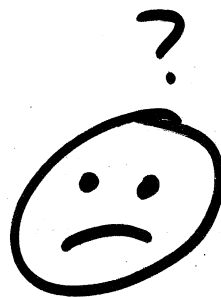
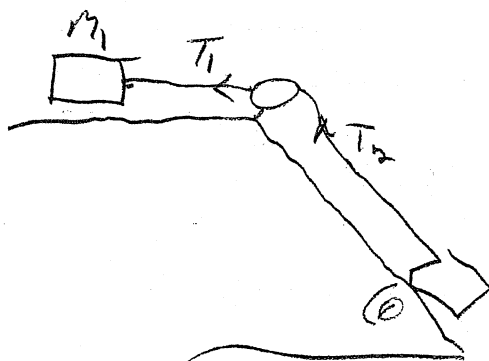
$$= \frac{(6.00 \text{ kg})(9.80 \text{ m/s}^2) \sin 30.0^\circ - (0.360)(2.00 \text{ kg})(9.80 \text{ m/s}^2) - (0.360)(6.00 \text{ kg})(9.80 \text{ m/s}^2) \cos 30.0^\circ}{6.00 \text{ kg} + 2.00 \text{ kg} + \frac{1}{2}(10.0 \text{ kg})}$$

$$= 0.309 \text{ m/s}^2$$

(a)

$$\Rightarrow 0.309 \text{ m/s}^2$$

STUDENT Sample: BAD!



10-39

$$\begin{aligned} m_1 g &= 19.6 \text{ N} \\ N &= 19.1 \text{ N} \\ U_n &= 7.06 \text{ N} \end{aligned}$$

$$\Sigma F_x = T - U_n$$

$$\begin{aligned} m_1 g \cos \theta &= 51.0 \text{ N} \\ m_1 g \sin \theta &= 29.4 \text{ N} \\ N &= 29.4 \text{ N} \\ U_n &= 10.58 \text{ N} \\ \Sigma F_x &= 51.0 - 10.6 \text{ N} \end{aligned}$$

Tips for correctly entering homework answers on the WileyPlus website.

1. Do NOT round off your final answer. The WileyPlus site does **not** take in account the correct # of significant figures in your answer. However, when you put the cursor over the answer box, you will see a pop-up note reminding you that your answer must be within $\pm 5\%$ of the correct answer. (see below picture)

So if the correct answer is 100, and you submit 103.18004587, your answer will be graded as “correct” (it’s less than 5% off) even though you have entered more significant figures than given.

Ex:

Flying Circus of Physics

The current world-record motorcycle jump is 77.0 m, set by Jason Reni his take-off speed.

The screenshot shows a WileyPlus problem interface. On the left, there are buttons for 'Number', 'Link to', and 'Hint'. The 'Number' button is highlighted with a red arrow pointing to a pop-up box that says 'the tolerance is +/-5%'. To the right of the 'Number' button is a 'Units' dropdown menu. A red arrow points to the dropdown menu, which is open and shows a list of units: 'This answer has no units', '° (degrees)', 'm', 'kg', 's', 'm/s' (highlighted in blue), 'm/s^2', 'N', 'J', and 'kcal'. The 'm/s' unit is selected.

2. Do not round off intermediate calculations. If you first need to calculate three other values, do not round off any of *these* values when making your final calculation.

3. Exponential notation:

Exponential notation is entered as follows:

7.2×10^6 is written in WileyPlus as: **7.2E6** and

1.8×10^{-4} is written in WileyPlus as: **1.8E-4** and so on.

4. Don’t forget to add correct units (if needed) using the drop down menu in the box provided (see above picture).

Find and register for your course section!

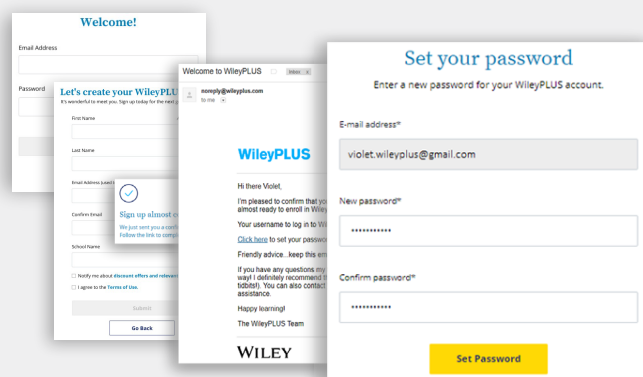
Your Course Section ID is

A40134

Step 1:

Sign up for a WileyPLUS account

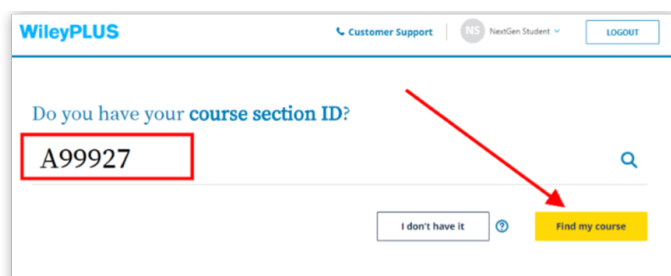
- Visit www.wileyplus.com/go/login.
- Click "Create Account" to create an account.
- Fill in your account details and set your password.
- If you already have a WileyPLUS account, just log in and click "Add more courses."



Step 2:

Enter your course section ID

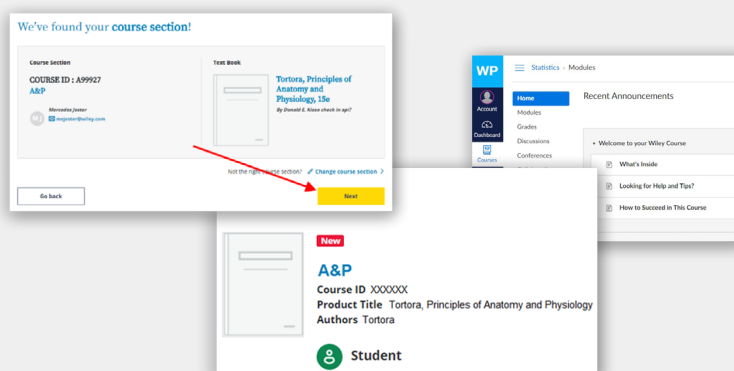
- Your six-symbol course section ID is provided by your instructor.
- Don't have your course section ID? Use the course finder and enter your school.



Step 3:

Access your course section

- Review your course section overview.
- Click the course section link to access your new course.



Need Help?

Live chat support: www.wileyplus.com/go/wpngsupport