

EXAM INSTRUCTIONS

There are 2 sections to this exam: a machine-graded section and a hand-graded section. The machine-graded portion consists of homework-style and conceptual questions. The hand-graded section consists of free-body diagrams that will be graded for accuracy and neatness.

Also:

- **WRITE YOUR CID ON EACH PAGE OF THE EXAM IMMEDIATELY**
- **You are free to write on the exam**
- Calculators are permitted
- No time limit
- **STAPLE YOUR EQUATION SHEET TO THE EXAM WHEN YOU ARE FINISHED**

MACHINE-GRADED SECTION

Homework-style Questions (4 pts. each)

For this portion of the test a numerical answer is required. When you have finished the calculation, the answer to be filled in on your bubble sheet will be **THE SECOND SIGNIFICANT DIGIT** of your final answer. For example: In question (1) below, if after doing the math you come to the conclusion that the distance is 7.4925 m/s, you would fill in bubble **4** on line 1 of the answer key. If, on the other hand, the answer happened to be 0.039571, you would color in bubble **9** on line 1 of the answer key, since **preceding zeros** don't count as significant digits.

A range of answers is given for each of these questions. For example: If the given range is {2.00, 6.00} m/s and your calculations show the answer to be 5.66 m/s, you can be reasonably confident in your answer and you should then proceed to fill in bubble **6** on the answer line corresponding to the question number. If you find you **need to round** in a problem, round only to the precision given in the range. In the above example, if you find your answer to be 5.399 m/s, you should round up to 5.40 m/s and fill in bubble **4** on the sheet.

Answer is 3.215 and the range given is {1.00,4.00}. What should be your answer?

- A) 3
- B) 2**
- C) 1
- D) 5
- E) 0

Answer is 0.3215 and the range given is {0.00, 4.00}. What should be your answer?

- A) 3
- B) 2**
- C) 1
- D) 5
- E) 0

Answer is 2.99999 and the range given is {1.00,4.00}. What should be your answer?

- A) 3
- B) 2
- C) 1
- D) 5
- E) 0**

Additional policies:

If I mess up a problem (answer falls outside range, etc.) then the problem is thrown out AND those that enter the testing center before the time I notify the class that the problem is thrown out will receive additional credit.

Check your official email before going to take the exam.

If you mess up a problem (fill in the wrong bubble, do the first significant digit instead of the second, etc.), there is no partial credit on a problem.

Exam topics

1. Average velocity, speed.
2. Projectile motion, independence of x/y motion
3. Kinematic equations, connecting distance, velocity, acceleration, and time
4. Vectors and relative motion
5. Kinematic equations including trig
6. Projectile motion requiring finding time to connect x/y motion
7. Average acceleration, force, mass
8. Static frictional force
9. Incline w/ friction
10. Speed vs. velocity
11. Definition of frictional forces
12. Relative velocity
13. Normal force, weight, including acceleration
14. Force, acceleration, and kinematics
15. Newton's first law, vectors
16. Projectile motion
17. Mechanical advantage from moveable pulleys
18. Newton's laws
19. Dependence of frictional forces
20. Position time graphs (a la bus/tree/school example in Class 1 notes)
21. Free-body diagrams and breaking forces up into components

The track and field world record for the 800-m run is 1 minute, 41.11 seconds and is held by Wilson Kipketer of Denmark.

What was his average *speed*? {7.00, 8.50} m/s

What was his average *velocity*? {0.0, 8.50} m/s Hint: Think about what a 400-m track looks like.

While channel surfing one uneventful Saturday morning, you find that the renowned “Provo’s Strongest Man” competition is on KBYU. You are delighted to see that Dr. Gee (obviously one of Provo’s strongest men) has entered the competition and is about to try to pull a boxcar 30 m along the tracks. As Dr. Gee steps up to the challenge, the knowledgeable announcer (a former Physics 105 student) tells the audience that the mass of the boxcar is 64,000 kg and the coefficient of static and kinetic friction between the boxcar’s steel wheels and the steel track are 0.74 and 0.57, respectively.

What force does Dr. Gee (obviously one of Provo’s strongest men) need to exert to get the boxcar moving? {400000, 800000} N

You are throwing a ball straight up in the air. At the highest point, the ball’s

- A. velocity and acceleration are zero.
- B. velocity is nonzero but its acceleration is zero.
- C. acceleration is nonzero, but its velocity is zero.
- D. velocity and acceleration are both nonzero.

An object is held in place by friction on an inclined surface. The angle of inclination is increased until the object starts moving. If the surface is kept at this angle, the object

- A) slows down.
- B) moves at uniform speed.
- C) speeds up.
- D) stops completely.