

QUIZ 3 1AW21

Full Name (Printed) _____

Full Name (Signature) _____

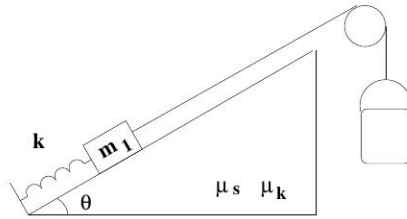
Student ID Number _____

- The exam is open-book and open notes. You will probably do better to limit yourself to a single page of notes you prepared well in advance.
- **All work must be your own.** You are not allowed to collaborate with anyone else, you are not allowed to discuss the exam with anyone until all the exams have been submitted (after the close of the submissions window for the exam).
- You have 30 minutes to complete the exam and sufficient time to scan the exam and upload it to GradeScope. The exam *must* be uploaded to GradeScope within the time allotted (that is, by the end of the first lecture hour). We will only accept submissions through GradeScope and will not accept any exam submitted after the submission window closes (CAE students must contact Corbin for instructions).
- **Given the limits of GradeScope, you must fit your work for each part into the space provided.** You may work on scratch paper, but you will not be able to upload the work you do on scratch paper, so it is essential that you copy your complete solution onto the exam form for final submission. We can only consider the work you submit on your exam form.
- **For full credit the grader must be able to follow your solution from first principles to your final answer. *There is a valid penalty for confusing the grader.***
- It is **YOUR** responsibility to make sure the exam is scanned correctly and uploaded before the end of the submission window. The graders may refuse to grade pages that are significantly blurred, solutions to problems that are not written in the correct place, pages submitted in landscape mode and/or work that is otherwise illegible - if any of this occurs, you may not receive *any* credit for the affected parts.
- Focus on the concepts involved in the problem, the tools to be used, and the set-up. If you get these right, all that's left is algebra.
- **Have Fun!**

The following must be signed before you submit your exam:

By my signature below, I hereby certify that all of the work on this exam was my own, that I did not collaborate with anyone else, nor did I discuss the exam with anyone while I was taking it.

Signature _____



3) A block of mass m_1 sits on a rough plane inclined at an angle θ with the horizontal. The coefficients of friction between the block and the plane are μ_s and μ_k . The block is connected on one side to a spring of constant k and on the other to a rope that is draped over a massless pulley. The other end of the rope is tied to a light hanging bucket. When we begin, the spring is unstretched and the bucket is hanging at rest.

- 3a) (5 points) Sand is slowly poured into the bucket until the bucket *just* starts to descend. No sand is added to or removed from the bucket from this point on. What is the mass of the sand and bucket (together) at this instant?

- 3b) (10 points) If we stop adding sand the moment the bucket begins to descend, how far up the plane will the block rise before coming (perhaps momentarily?) to rest?

- 3c) (10 points) How large would the force of friction that acts on the block have to be in order to prevent the block from sliding back down the plane, once it has reached its highest point?

- 3d) (5 points) Will the block stay at rest at its highest point on the plane or will it slide back down? Back this up with a calculation.