Midterm α, Physics 1P21/1P91

Prof. M. Reedyk

October 28, 2009

Name	
Student ID	

Circle your course number above

No examination aids other than those specified on this examination script are permitted (FHB 5.1.2.A). Use or possession of unauthorized materials will automatically result in the award of a zero grade for this examination.

This is a closed–book test, only calculators are allowed
Formulas not on the supplied formula sheet must be derived

Attempt all questions

Question	Mark	Out of
1	a b c d e	2
2	a b c d e	2
3	a b c d e	2
4	a b c d e	2
5	a b c d e	2
4		10
5		10
Total		30

This exam contains 5 pages. Please, verify that your copy is complete.

For questions 1–5: circle the correct answer **on the front page**.

(2) **1**. Two balls, identical except for colour, are projected horizontally from the roof of a tall building at the same instant. The initial speed of the red ball is twice the initial speed of the blue ball. Ignoring air resistance,

- **a.** the red ball reaches the ground first.
- **b.** the blue ball reaches the ground first.
- **c.** both balls land at the same instant with different speeds.
- **d.** both balls land at the same instant with the same speed.
- **e.** not enough information is given to predict which ball lands first.

(2) **2**. You are standing on a bathroom scale in an elevator. In which of these situations must the scale read the same as when the elevator is at rest?

- **a.** Moving up at constant speed.
- **b.** Moving up with increasing speed.
- **c.** Moving down with increasing speed.
- **d.** Moving down with decreasing speed.
- **e.** In free fall (after the elevator cable has snapped).

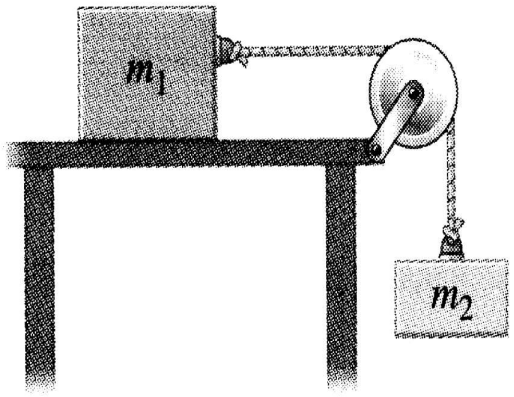
(2) **3**. To make an object start moving on a surface with friction requires

- **a.** less force than to keep it moving on the surface.
- **b.** the same force as to keep it moving on the surface.
- **c.** more force than to keep it moving on the surface.
- **d.** a force with a magnitude equal to the weight of the object.
- **e.** a force with a magnitude equal to the normal force exerted by the surface on the object.

(2) **4**. A spider sits on a turntable that is rotating at a constant 33 rpm. The acceleration of the spider

- **a.** is greater the closer the spider is to the central axis.
- **b.** is greater the farther the spider is from the central axis.
- **c.** is nonzero and independent of the location of the spider on the turntable.
- **d.** cannot be determined without knowing the angular displacement.
- **e.** is zero.

(2) **5**. Two blocks are connected by a light string passing over an ideal pulley. The block with mass m_1 slides on the frictionless horizontal surface, while the block with mass m_2 hangs vertically ($m_1 > m_2$). The tension in the string is



a. greater than $m_1 g$.

b. equal to $m_1 g$.

c. greater than $m_2 g$ but less than $m_1 g$.

d. equal to $m_2 g$.

e. less than $m_2 g$.

(10) **6**. From the edge of the rooftop of a building, a boy throws a stone at an angle 25^o above the horizontal. The stone hits the ground 4.20 s later, 105 m away from the base of the building. (Ignore air resistance). Find the height of the rooftop.

(10) **7**. An 80.0 N crate of apples sits at rest on a ramp that runs from the ground to the bed of a truck. The ramp is inclined at 20.0^o to the ground.

1. What is the normal force exerted on the crate by the ramp?
2. What is the static frictional force exerted on the crate by the ramp?
3. What is the minimum possible value of the coefficient of static friction?