

Original

Exam 1 Physics 2048

You have up to 60 minutes (until 3:30 pm)

Name:

Student ID:

- Please show all your work
- If you need more paper please tell me

- $a_c = \frac{V^2}{r}$

Problem 1a

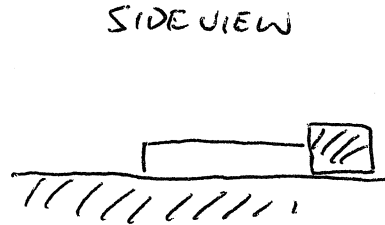
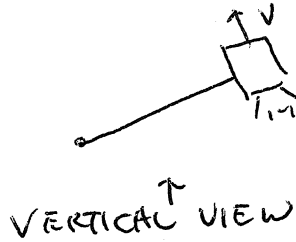
An object traveling with velocity 40 m/s accelerates at -4 m/s^2 for ~~500~~ ^{160 m} m.

- Calculate its final velocity [8.25 pts]
- How long does it take to go the ~~500~~ ¹⁶⁰ m? [8.25 pts]

Problem 1b A ball is launched at 60° angle from horizontal with initial speed of 30 m/s. Does it clear the structure with height 19 m located 15 m away from the launch point? [16.5pts]



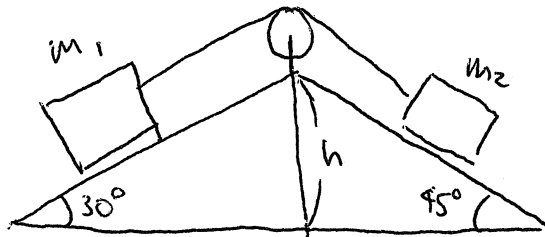
Problem 2 A jet engine exerts enough force to keep a ball (with total mass of 100 kg), tethered to a pole, moving on a surface in a uniform circular motion with radius of 100m and $|\vec{V}| = 30\text{m/s}$. Kinetic coefficient of friction is 0.3.



- Draw Force Diagram in radial direction and vertical direction. [5 pts]
- What is the acceleration of the block? And which direction does it point? [11pts]
- What is the force supplied by the jet engine? [8 points]
- What is the tension of the rope? [9 pts]

Problem 3

Given a situation below and assuming that there are no friction



$$m_1 = m_2 = 10 \text{ kg}$$

$$h = 4 \text{ m}$$

- (a) Draw Force Diagram [11 pts]
- (b) Find acceleration [11pts]
- (c) Find tension [11pts]