

2200/2210 EXAM 2

Question 1. Bill is an astronaut and has a mass of 63.5 kg when he is launched into space to the Moon, the rocket acceleration is 27.6 m/s^2 .

- What is his apparent weight?
- On leaving the Moon his rocket's acceleration is the same but the lunar gravitational acceleration is only 1.6 m/s^2 . What is his apparent weight now?

Question 2. Student Jane pushes on a crate with enough force to overcome static friction and then maintains this force as the crate accelerates. The crate has a mass of 300 kg, $\mu_s = 0.75$, $\mu_k = 0.31$, the floor is horizontal as is her force.

- Calculate the acceleration and
- How far is the crate moved by Jane in 4.75 seconds?

Question 3. A 2.11 kg can of baked beans rest on a wooden plank. When the wooden plank is tilted to 41.7° the can begins to slide. Calculate the coefficient of static friction μ_s . A free body diagram is required.

Question 4. A circus human cannonball has his net located 19.6m from his cannon and at the same height. If the cannon fires at the fixed elevation of 37.1° at what initial speed must he be fired to land on his net?

Question 5. A highway curve of radius 355m is designed for traffic moving at a speed of 55.3 mph. What is the correct banking angle of the road?

Question 6. Jim forces a 6.3m diameter merry-go-round to accelerate up to 1.66 radians/sec from rest.

- How long did it take Jim to reach the final angular speed? Given that the tangential acceleration is equal to the one-tenth of the radial acceleration at the end.
- How many revolutions did the merry-go-round make?
- What is the radial force in Jim's hand with which he holds on to the edge of the merry-go-round at its final angular speed if his mass is 63.7 kg?