

**Essay Questions** (10 points each). **Show your work**, partial-credit will be given. **Circle** your answer.

1) A machine gun, of mass 39.4 kg, fires 11.4-gram bullets, with a velocity of 764 m/s coming out of the barrel of the gun, at the rate of 399 rounds per minute. What is the average force exerted on the gun mount?

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2) A child (48 kg) stands on the edge of a stationary merry-go-round (uniform disk of radius 1.2 m and mass 50 kg). The child jumps off at 1.0 m/s with respect to the ground in the direction tangential to the edge. Find the angular speed of the merry-go-round after the jump. Assume there is no friction on the axle of the merry-go-round.

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3) A uniform 7.9-m plank weighing 130 N lies on a platform with 3.5 m jutting off the platform. How far out on the plank from the edge of the platform can a 31-N dog walk without tipping the plank?