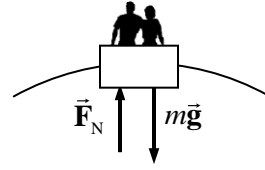


## Gravity and Circles Packet

1. (I) A horizontal force of 210 N is exerted on a 2.0-kg discus as it rotates uniformly in a horizontal circle (at arm's length) of radius 0.90 m. Calculate the speed of the discus.
2. (II) What is the maximum speed with which a 1050-kg car can round a turn of radius 77 m on a flat road if the coefficient of static friction between tires and road is 0.80? Is this result independent of the mass of the car?
3. (II) A device for training astronauts and jet fighter pilots is designed to rotate a trainee in a horizontal circle of radius 12.0 m. If the force felt by the trainee on her back is 7.85 times her own weight, how fast is she rotating? Express your answer in both  $\text{m/s}$  and  $\text{rev/s}$ .

4. (II) How many revolutions per minute would a 15-m-diameter Ferris wheel need to make for the passengers to feel “weightless” at the topmost point?



5. (I) Calculate the force of Earth’s gravity on a spacecraft 12,800 km (2 Earth radii) above the Earth’s surface if its mass is 1350 kg.

6. (II) Calculate the acceleration due to gravity on the Moon. The Moon’s radius is  $1.74 \times 10^6$  m and its mass is  $7.35 \times 10^{22}$  kg.

