Universität Leipzig, Fakultät für Physik und Geowissenschaften

Exercises for Experimental Physics 1 – IPSP

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Exercise Sheet 4 (WS 2011/12)

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Date of Submission: Nov. 4th 2011

Submission Place: Marked mailbox next to room 302 (Linnestr. 5)
Submission Time: 11:00 a.m. at the submission day noted above

Please note: Write your name and matriculation number on EACH sheet of paper.
Only submit the calculations and results for exercise 1-3, exercise 4 will be discussed during the instruction classes.

Exercises:

1. In 1978, Geoff Capes of Great Britain threw a heavy brick a horizontal distance of 44.5 m. Find the approximate speed of the brick at the highest point of its flight, neglecting any effects due to air resistance. Assume the brick landed at the same height it was launched. (6 Points)

2. (a) What are the period and speed of the motion of a person on a carousel if the person has an acceleration magnitude of $0.80\,m/s^2$ when she is standing 4.0 m from the axis? (b) What are her acceleration magnitude and speed if she then moves in to a distance of 2.0 m from the carousel center and the carousel keeps rotating with the same period? (7 Points)

3. If you push a block whose mass is m_1 across a frictionless floor with a horizontal force of magnitude F_0, the block has an acceleration of $12\,m/s^2$. If you push on a different block whose mass is m_2 with a horizontal force of magnitude F_0, its acceleration is $3.0\,m/s^2$. (a) What acceleration will a horizontal force of magnitude F_0 give to a single block with mass $m_2 - m_1$? (b) What acceleration will a horizontal force of magnitude F_0 give to a single block with mass $m_2 + m_1$? (7 Points)

4. A chain consists of 5 links, each having a mass of 0.10 kg. The chain is being pulled upward by a force applied by your hand to its top link, giving the chain an upward acceleration of $2.5\,m/s^2$. Find (a) the force magnitude F exerted on the top link by your hand; (b) the net force on each link; and (c) the magnitude of the force each link exerts on the link below it.