Isaac Newton as an Inspiration for School Children

Sheila Galt
Chalmers University of Technology
Gothenburg, Sweden

Prague, Nov 8 2012
Isaac Newton as an Inspiration for School Children

Sheila Galt
Chalmers University of Technology
Goals

• Give a good feeling about math and science
• Aid in teaching physics
• Inspire teachers
• Disarm misconceptions about professors in ivory towers
Meet Isaac Newton

• Who is Isaac Newton?
• Act 1 – Mechanics
• Act 2 – Optics
• Act 3 – Mathematics
• Epilogue
School visits

• Grades 4-6, age 10-12
• 19 classes from Gothenburg region
• Sep-Oct 2011 and April 2012
• House of William Chalmers
Who is Isaac Newton?

• Born on Christmas Day 1642
• Focus on childhood
• Story of Principia
Act 1 - Mechanics

• Why doesn’t the moon fall down like the apple does?
• acceleration, gravity, force, inertia
• hypothesis, experiment, observation
2-way Communication

• Ask questions
• Question the answers
• Declare hypothesis
• State observations
• Think, associate, side-track
• → Spontaneous new content
Act 2 - Optics

• Newton’s technical problem: a bad telescope
• light, lens, focus, mirror
• colour, prism, spectrum, diffraction
Factors for success

• Enthusiasm
• Time allocation (funding)
• Suitable location (funding)
• Experimental equipment (funding)
• Endorsement from leaders
Act 3 - Mathematics

• Newton’s new math:
  rate of change → “derivative”
• position, speed, acceleration
• Take a ride on the “derivative wagon”
Engaging students

• Cascade learning
• Close the age gap
• Curriculum change
• Faculty attitudes
Epilogue

• “Sir” Isaac at the Royal Mint: a counterfeiter’s nightmare
• alchemy, pseudoscience, fuzzy thinking
• scientific method
Visions for the Future

• Increased number of classes
• Teacher training before and after
• Student involvement
• Road show to distant schools
• Follow-up of attitudes and learning
Thank you for your attention!