

# **Modelling Skills**

**What is a model?**

# PROJECTS

- Project 1 - Pumping a Swing
- Project 2 - Spread of Infectious Disease
- Project 3 - Cell Transport (Chemotaxis)?
- Project 4 - Melting and Freezing ?

# TIMETABLE

- WK 1 Th 10-12 Project 1
- Wk 1 Fr 12-1 Project 1
- Wk 2 Th 10-12 Project 1
- Wk 2 Fr 12-1 Project 2
- Wk 3 Th 10-12 Project 2
- Wk 3 Fr 12-1 Project 2
- Wk 4 Th 10-12 Presentation prep + Presentations
- Wk 4 Fr 12-1 Presentations

## **TIMETABLE (cont'd)**

- WK 5 Th 10-12 Project 3
- Wk 5 Fr 12-1 Project 3
- Wk 6 Th 10-12 Project 3
- Wk 6 Fr 12-1 Project 4
- Wk 7 Th 10-12 Project 4
- Wk 7 Fr 12-1 Project 4
- Wk 8 Th 10-12 Presentation prep + Presentations
- Wk 8 Fr 12-1 Presentations

# **ASSESSMENT**

- There is no assessment – but next term you will do case studies and this will be assessed on a presentation

- “This model will be a **simplification** and an **idealization**, and consequently a **falsification**. It is to be **hoped** that the features retained for discussion are those of **greatest importance** in the present state of knowledge.” Turing, 1952

A.M. Turing, The chemical basis of morphogenesis, Phil. Trans. R. Soc. B, 237, 37-72 (1952)

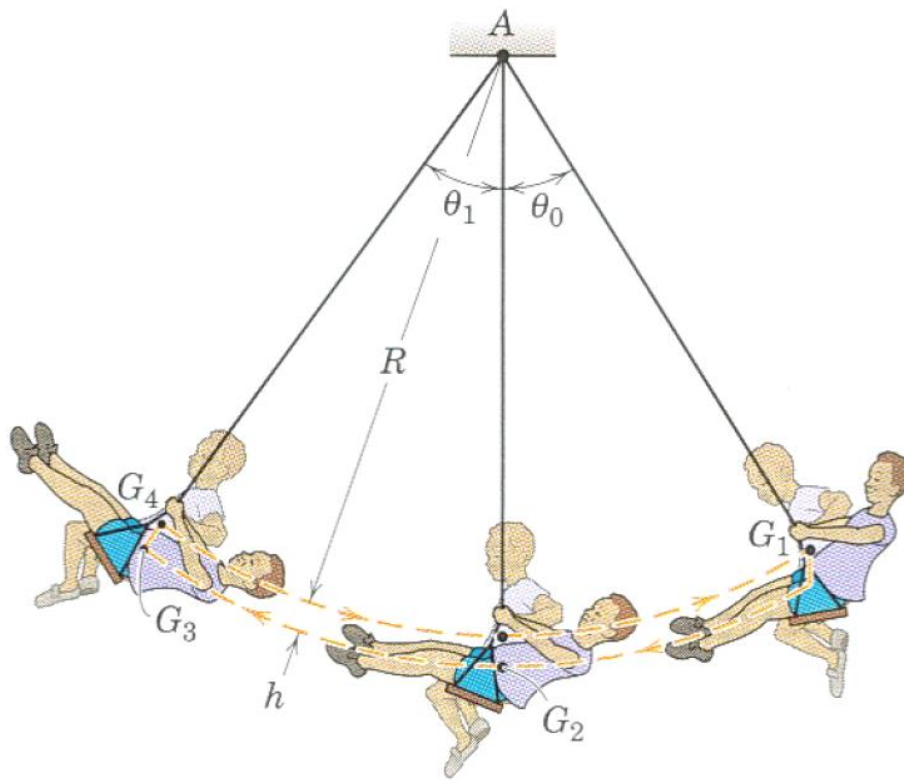
# Why Model?

- What question are you trying to answer?
- Why use a mathematical model (why not just do experiments?) Hypothesis testing/generating
- How will you test your model – it must give results consistent with observations but that is only a start!
- Validation

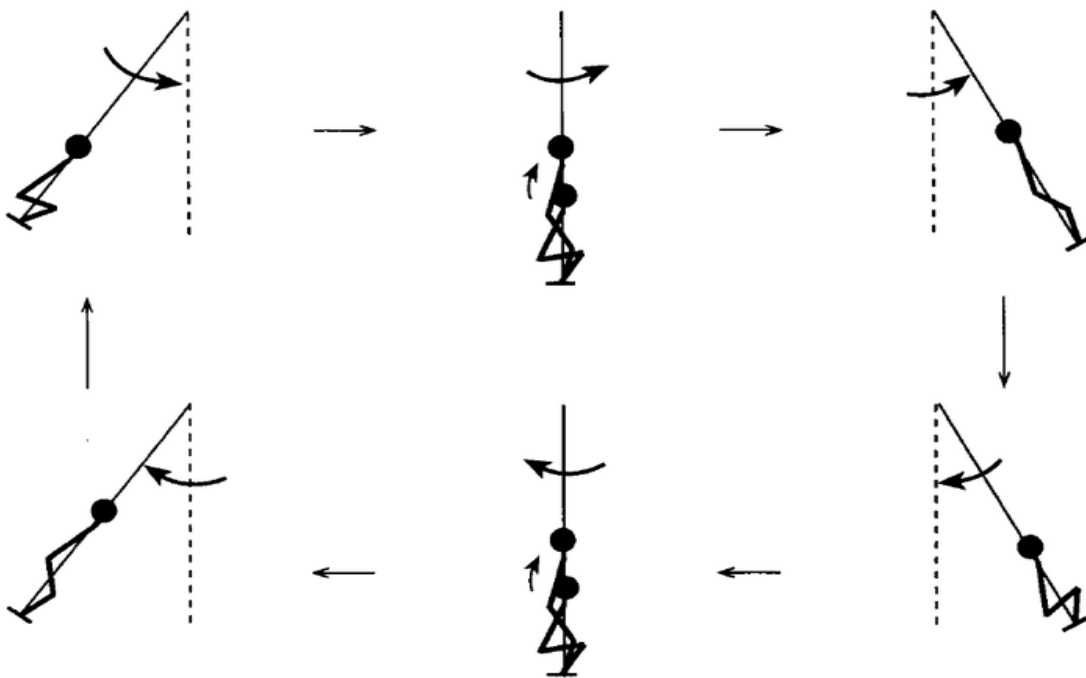
**SWING**



# “Pumping a Swing”



# Standing



Strategy for Pumping a Swing while Standing

# Aim and Questions

- The aim is to model the motion of a rider on a swing to answer the following questions:
  1. How can motion be generated and sustained by the action of the rider?
  2. What is the quickest way to build up, or slow down, the amplitude of motion?
  3. Is sitting or standing more effective?