# Preparatory Knowledge: Propaedeutic in Informatics

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- Informatics has developed extremely rapidly
- Numerous products, but their half-life diminishes dramatically
- In 1996 Dr. Smerdon pointed out the half-life of technical knowledge
  - → of a mechanical engineer is 7.5 years,
  - → five for electrical and
  - → 2.5 for software engineers.

Quelle: Smerdon, Ernest T. *It takes a lifetime.* ASEE PRISM, December 1996, 56.

- Therefore, a quest for basic principles in Informatics with long-term validity

- Fundamentals or „unchanging values"

- Should play an important part in the curricula of schools

- Examples of fundamentals or „unchanging values" in Informatics
  - → Models/Modelling
    - » Abstraction
    - » States (reversible/irreversible)
  - → Algorithm
    - » Iterative/Recursive
    - » Sequential/Parallel
    - » Time Complexity
    - » Decidabiliy, Computability, NP complete problems
  - → Syntax/Sematics
    - » Information, Language, Alphabet
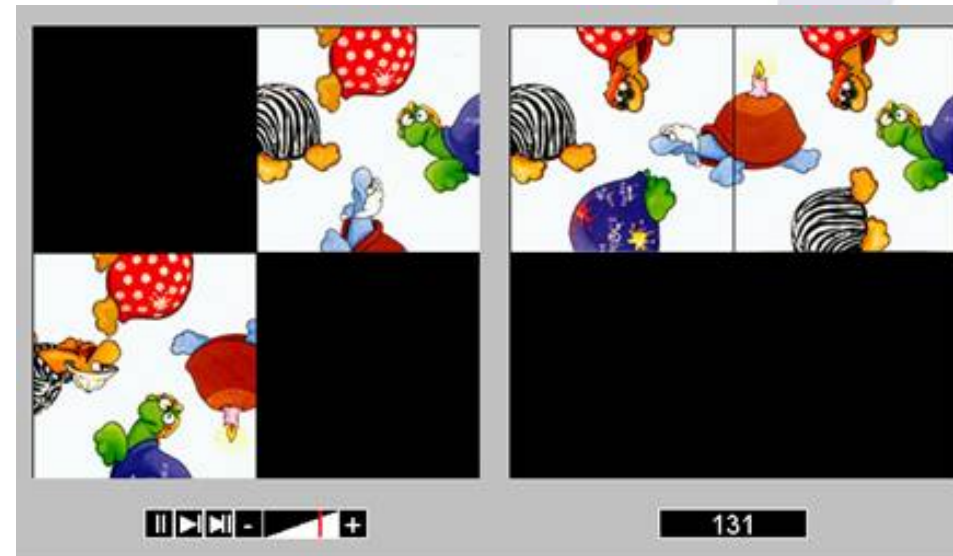  - → ...

- Concrete examples
- Based on 2 applets
- First:
  - → A balance
    - » Model
    - » Abstraction
    - » States
    - » Algorithm
    - » Number systems
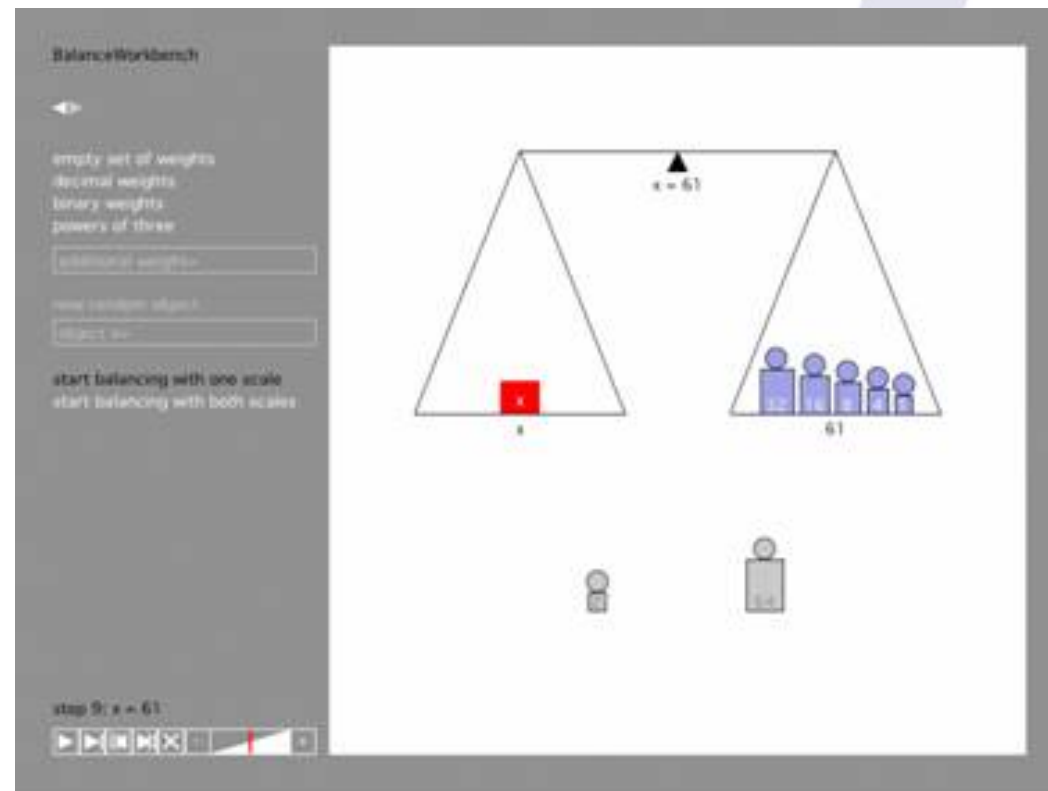
- Concrete examples
- Second:
  - → A puzzle
    - » Time Complexity
    - » Decidability
    - » Computability
    - » NP complete problems



- More information about the applets and the whole electronic material of "Propaedeutic in Informatics" (available on a CD) can be found at http://welearn-lavista.fim.uni-linz.ac.at

- Just imagine a 5x5 puzzle
  - → Number the pieces from 1 to 25.
  - → Arrange all pieces in a sequence. We thus obtain all n! sequences of the n (= 25) numbers.
  - → For each resulting sequence, check whether it solves the puzzle.
  - → In the worst case it takes n! tries to find the correct sequence!

  - → If we omit the rotations and use a computer with a billion checks per second:
  - → Placing: 25! = 1·55*10^25 seconds, i.e. ~ 4·9*10^11 years.
  - → That is still 15 times as long as the time that has elapsed since the original big bang!

- Propaedeutic in Informatics
  - → An introductory course for informatics students at the Johannes Kepler University Linz
  - → Blended Learning: lectures and phases of self-organized study alternate
  - → Electronic material was developed, also issued for use in secondary schools

- Propaedeutic in Informatics
  - Electronic material
    - » Study Guide: guidance for self-organized study, explanation of parts of the subject matter, presented in the form of a dialogue between youngsters, and aimed particularly at pupils in the final years of secondary education
    - » The entire study material in the form of illustrated, partly interactive HTML pages
    - » The study material in full as text, also available as printed lecture notes
    - » The full set of transparencies for individual lectures
    - » Self-assessment: exercises, sample examination paper, to enable students to check how far they have got and which parts of the subject matter they need to go over in more depth
    - » Study applets, on the basis of which students can carry out experiments and simulations and thus penetrate the subject matter.

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- Informatics has developed extremely rapidly
- Numerous products, but their half-life diminishes dramatically
- Purely product-related knowledge and skills are inadequate
→ Logical and necessary to concentrate on the basic concepts
→ New media and eLearning can help to present these „unchanging values" more effectively

# Thank you for your attention
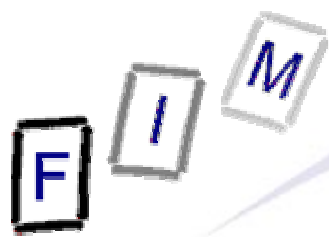
- OCG Forum E-Learning
  - → http://ocg-elearning.fim.uni-linz.ac.at
- Account:
  - → Login and Password: gast
  - → or email to loidl@fim.uni-linz.ac.at

- Idea: To draw the E-Learning map of Austria
  - → Projects/Activities
  - → People behind the projects/activities
  - → Exchange of ideas/Cooperation
- Next „physical" meeting: ICL 2005 (28. – 30.9.) in Villach
  - → Special Session: Call for Contributions