Learn Chemistry

# Commercial Skills for Chemists: Project Management

## Leaning Tower of Pasta - Student Pack

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This resource was produced as part of the National HE STEM Programme

National HE STEM Programme

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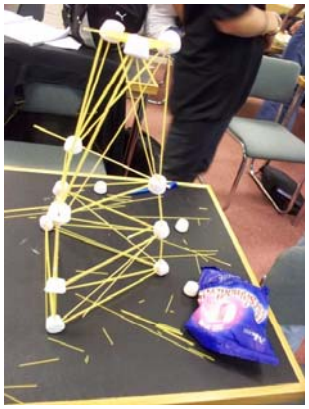
## ‘*The Leaning Tower of Pasta*’

### *Project Management Exercise*



We are investigating the potential of complex polysaccharides and dehydrated starch-based renewables as highly insulating building materials*

**40% of the UK’s carbon footprint comes from heating and cooling buildings, but many insulating materials are petroleum-based*

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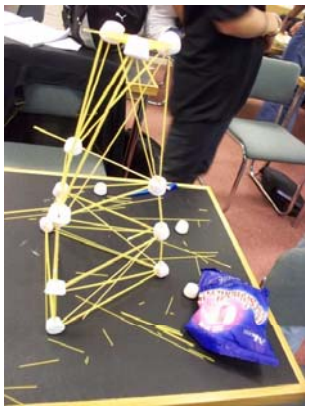
## *Project Management Exercise*

- Build the tallest free-standing tower you can from the renewable materials provided*
- It must support a small weight
- Height to be measured to the point where weight is supported
- You have 45 minutes to beat the one in the picture



** Complex polysaccharides and dehydrated starch-based renewables*

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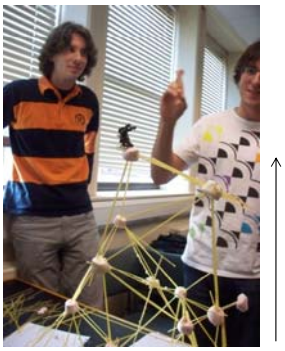
## *Project Management Exercise*

- This is the weight I use!*

- Measure height to bottom of base



**Games Workshop 'classic' metal Space Marine ~ 10 grams*

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## *Post Exercise Analysis*

- How tall did you make the tower?
- Was it stable?

- What are the problems with using pasta?
- What are the problems of using marshmallows?

- If you had to do it again what would you change?

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## *Post Exercise Analysis - Team Roles*

- Who seemed to be doing what within the team?
  - Bossing others around?
  - Wanting to get started?
  - Coming up with ideas?
  - Encouraging others?
  - Quietly getting on with it?
  - Checking what was needed?
- Was there any conflict in the team?
- Was it resolved, and if so how?
- Google 'Belbin test' and see whether this illuminates what was happening!
- Would you do anything different next time?

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Research & Idea

## *Idea Generation*

- Can you think of any better ways to build the tower?
- How would you overcome the problems of the materials?
- Can you think of any chemical ways of improving the materials?
  - How about using a chemical treatment?

- *Spend 10-20 mins coming up with some ideas*

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Research & Idea

## *Literature Survey*

- 'Induced flexibility of dehydrated starch-based renewables with dihydrogen monoxide treatment' *(Pasta et al dente, 1999)*
- 'Increased adhesive properties of polysaccharide gels interacting with oxygen dihydride' *(Sticki & Messi 2003)*
- 'Stable lattice formation in starch-based renewables. Pioneering work facilitated by boiling hydronium hydroxide' *(Reef & Knott 2009)*

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Proof of Principle

## *Proof of Principle*

- Devise and carry out a series of experiments to test your ideas of material improvement and tower construction techniques
- You are allowed 1 chemical substance to help with your research

  (dihydrogen monoxide)*

- *Spend 30 mins to 1 hour on these experiments*

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** Google for safety information*

Development Project

# Development Project

- Plan and execute a new pasta tower project
  - Identify the tasks, estimate the time required and flow chart the project
  - Allocate roles
  - Plan for review meetings
  - Write safety procedures for potential hazards
    e.g. handling dihydrogen monoxide
  - Identify main risks and your 'Plan B'

- *Time allowed $^1/_2$ hour for planning, 1 hour to build!*

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# Your New Technical Target

*Current record holders – 42 inches,*

*Edinburgh University Architecture Students:*

*Anthony Richardson, Mario Kong, Lizzie Murphy and Rachel Slater*

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