Scientific Research

Problem Solving Methods

How do scientists “do” research?

- Your ideas:

Elements of Research

- What is the problem?
  - Based on observations or earlier research
  - How can we define the research problem?
  - How can we do measure it?
- Hypothesis - logical prediction to the problem
  - What results are expected based on earlier research?

Identifying problems

Relationships
Suppositions
Differences
Disturbances
Comparisons
Challenges
Similarities
Obstacles

Surprises
Patterns
Opportunities
Experiments needed
Problematic situations
Unexpected failures

Elements of Research

- Experiments
  - What measurements will show whether the prediction in the hypothesis is true or not?
  - Data: measurements & observations
    - Careful recording of the data
    - Reliable : Accurate & precise
- Conclusions

Elements of Research

- Conclusions
  - What does the data tell us about the problem?
  - Does it support the hypothesis (prediction)?
  - How can we communicate the results so they can understand our work & our conclusions?
    - Careful explanations
    - Graphs
    - Other ways – Pictures, etc.
  - What does the data suggest for further research?

Expectations

- Following procedures carefully
- Recording all your measurements & observations
- It is OK to make a mistake, but it is not OK to cover up a mistake
- Ask questions

You help to define the problem

- Computer to research
- Present to the class what you have discovered
  - Creative & colorful posters

What is the problem we are trying to investigate?

- American Chestnut Tree
- Chestnut Blight
- Blight resistance of different trees
- Examples of other blights that have killed important plants
- What is the impact of a blight on plant biodiversity?