

Aquaponics and NGSS in the Elementary Grades

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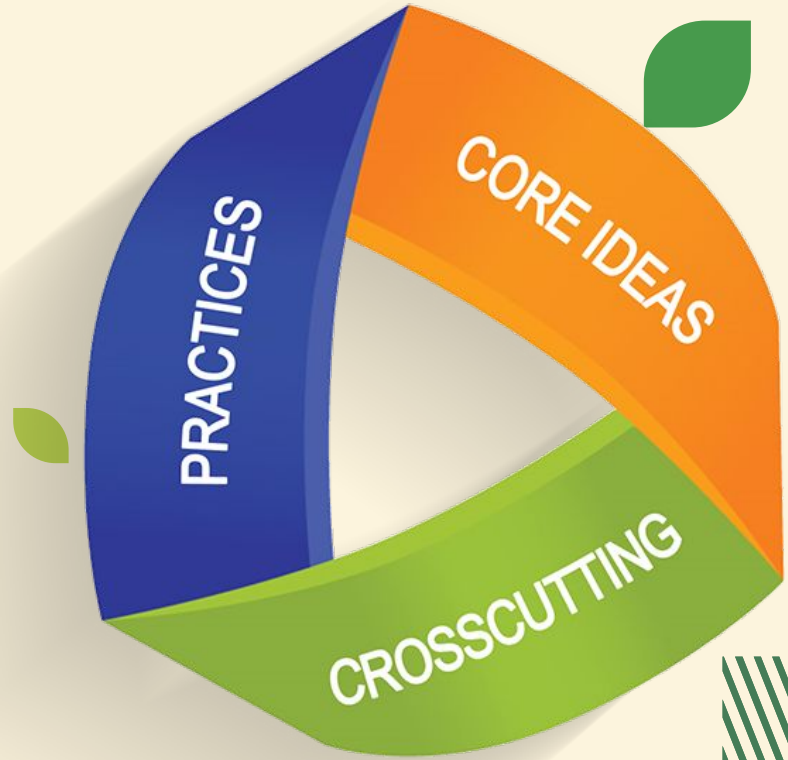


Plants clean water for fish



A Quick Intro to Next Generation Science Standards

The NGSS are K-12 science content standards. The goal when developing these standards was to create a set of research-based content standards that build on each other and incorporate 21st century skills.



DIMENSIONS of SCIENCE LEARNING



CROSSCUTTING CONCEPTS

Help students explore connections between domains of science



SCIENCE AND ENGINEERING PRACTICES

Describe what scientists do to explore the natural world and what engineers do to design and build systems



DISCIPLINARY CORE IDEAS

Key ideas in science, separated into four domains: Life Science, Physical Science, Earth and Space Science, Engineering

CROSSCUTTING CONCEPTS



PATTERNS

Identify patterns, use as evidence, predict change



CAUSE AND EFFECT

Identify and test causal relationships



SCALE, PROPORTION AND QUANTITY

Use standard units of measurement



SYSTEMS AND SYSTEM MODELS

Identify components of systems and how components are interconnected



ENERGY AND MATTER

Identify conservation of matter by tracking flows and cycles



STRUCTURE AND FUNCTION

Structure of materials helps determine function

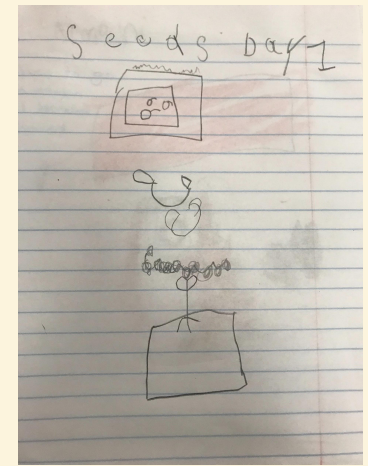
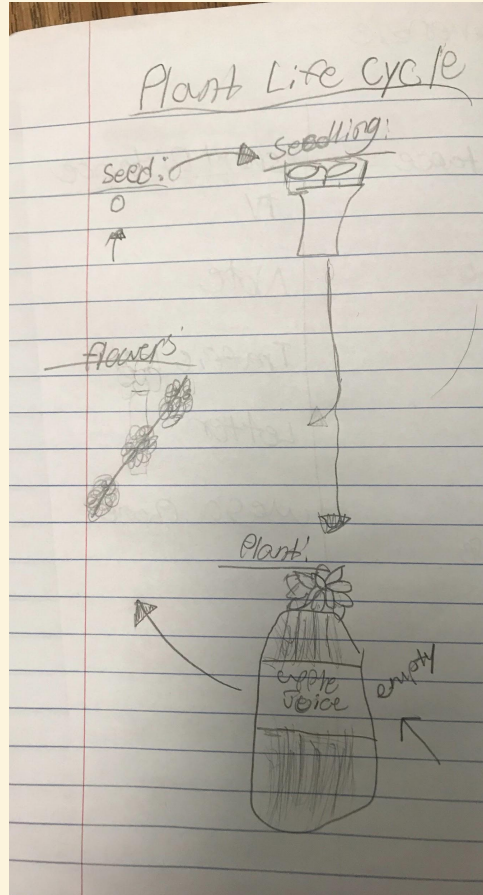


STABILITY AND CHANGE

Measure change in terms of differences over time in systems

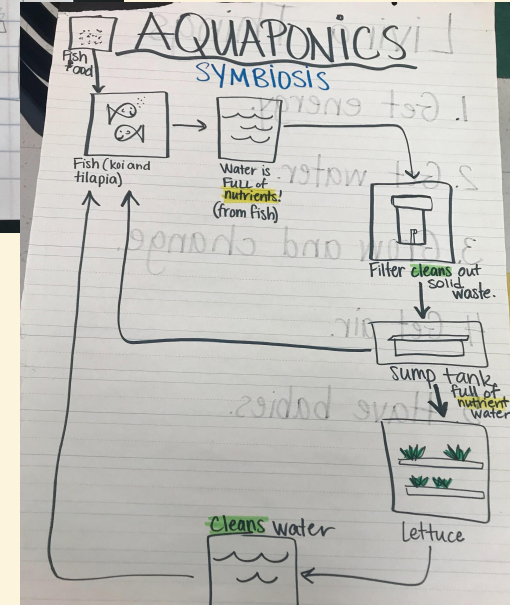
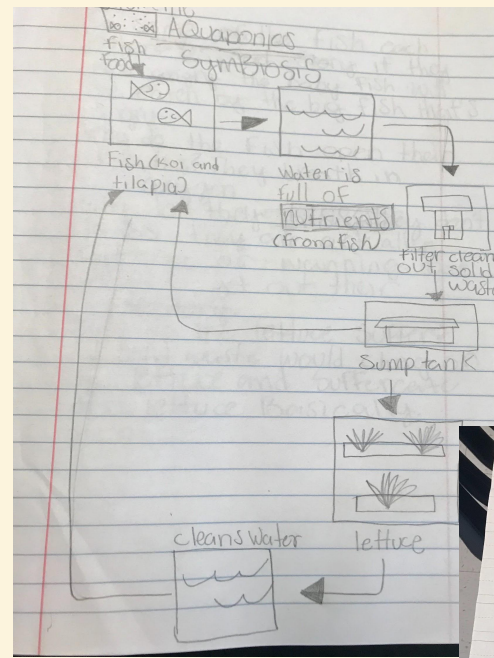
PATTERNS

- Identify life cycles in the aquaponics system



SYSTEMS AND SYSTEM MODELS

- Learning about the parts of the aquaponics system
- Learning about the relationship between the fish and the plants via the system



MATTER AND ENERGY

- Track flow of energy through the aquaponics system
- Explore feeding rates and relationship between amount of food given to fish and plant growth



STABILITY AND CHANGE

- Observations of plants, especially tracking growth
- Comparing growth rates
- Water chemistry testing

	Wait 5 min Goal: 0 ppm	Wait 5 min Goal: 0 ppm	Wait 5 min Goal: 40-500 ppm
pH			
Ammonia			
6.6 (add 100 µL)	0.25 ppm	0.25 ppm	5.0 ppm
6.0 (add 100 µL)	0.50	0.8 ppm	7.5.0
6.0 (add 100 µL)	0.25 ppm	0 ppm	0 ppm
6.4 (add 100 µL)	0 ppm	0 ppm	≤ 5.0 ppm
7.0 (add 100 µL)	0.25 ppm	0 ppm	8.9 ppm
7.0 (add 100 µL)	0.25 ppm	0 ppm	20 ppm





THANKS!



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Do you have any questions?

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