HARVEST OF THE MONTH - NOVEMBER / PUMPKINS

Grades 9-12

KANSAS STATE DEPARTMENT OF EDUCATION

Kansas leads the world in the success of each student.

JULY 17, 2025

Kansas State Board of Education

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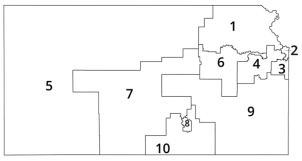

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SUCCESS DEFINED

A successful Kansas high school graduate has the

- Academic preparation,
- Cognitive preparation,
- Technical skills,
- Employability skills and
- Civic engagement

to be successful in postsecondary education, in the attainment of an industry recognized certification or in the workforce, without the need for remediation.

OUTCOMES

- Social-emotional growth
- Kindergarten readiness
- Individual Plan of Study
- Civic engagement
- Academically prepared for postsecondary
- High school graduation
- Postsecondary success

Kansans CAN

MISSION

To prepare Kansas students for lifelong success through rigorous, quality academic instruction, career training and character development according to each student's gifts and talents.

VISION

Kansas leads the world in the success of each student.

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Kansans Can

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Kansas leads the world in the success of each student.

July 1, 2025

HARVEST OF THE MONTH

November / Pumpkins

INTRODUCTION

Over the next few weeks, we will be learning about a kind of food that we grow in Kansas. I'm going to give you some clues to see if you can guess what this food is.

- Although we often think of this food as vegetables, they are actually fruits.
- Each of these fruits contains about 500 seeds.
- Beta carotene gives this fruit is orange color. Beta carotene is great for your eye and skin health and your immune system.
- They can range in size from small enough to fit in the palm of your hand to so big that you can crawl on it!
- We eat this fruit cooked and softened, smashed up in pies, roast and eat their seeds, or carve them into jack-o-lanterns during Halloween.

Can you guess what food I'm talking about? We will be learning about pumpkins!

VOCABULARY

Kinetic Energy - The energy an object has because it is moving. The faster something moves, the more kinetic energy it has

Potential Energy - Stored energy that an object has because of its position or condition. For example, a rock at the top of a hill has potential energy because it can roll down

Prototyping - The process of creating a model or early version of a design to test how it works and make improvements

GENERAL RESOURCES

ENGAGE

Pumpkins are iconic symbols used by many Americans to celebrate the fall season. Pumpkins come in many varieties and have uses that range from culinary to decorative. Ask students to engage in a simple notice/wonder routine while they watch a video[1] that shows a unique fall tradition in one Delaware community.

EXPLORE

Students will be asked to engineer a "Punkin Chunkin" device. Their goal is to design a machine that will efficiently convert the potential energy of a mini-pumpkin into kinetic energy (i.e. which machine will hurl a mini-pumpkin the farthest). Have students help develop the "rules of competition", including how each team's success will be quantified. Students may use this Engineering Design Tool to help them develop their device.

Teacher Preparation:
Each team should have 2 mini pumpkins–1 for prototyping and 1 for the final test. Other suggested supplies include:

- Popsicle sticks
- Balsa wood
- Rubber bands
- Straws
- Plasticware
- Pushpins
- Pipecleaners
- Any "found" items bound for recycling (yogurt cups, butter dishes, egg cartons, etc.)
- Glue

On the day of competition, consider taking the class to an outdoor space.

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1 https://www.youtube.com/watch?v=dmSyrGsqmg8

ELABORATE

Food waste is an important contributor to carbon emissions. Have the students gather the seeds from the pumpkins they have launched and clean them of pulp. Share the Roasted Pumpkin Seeds recipe[2] with them so that they can roast their seeds for a tasty and healthy snack! The remaining pumpkin bits can be composted. Students can read this article[3] from the UN Environmental Programme that explains the environmental benefits of composting.

KANSAS SCIENCE STANDARDS ADDRESSED

HS-PS3-3 Ecosystems: Interactions, Energy, and Dynamics

Students who demonstrate understanding can:

HS-PS3-3

Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.*

Clarification Statement:
Emphasis is on both qualitative and quantitative evaluations of devices. Examples of devices could include Rube Goldberg devices, wind turbines, solar cells, solar ovens, and generators. Examples of constraints could include use of renewable energy forms and efficiency.

Assessment Boundary:
Assessment for quantitative evaluations is limited to total output for a given input. Assessment is limited to devices constructed with materials provided to students.

The performance expectations above were developed using the following elements from the NRC document A Framework for K-12 Science Education.

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.

- Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.

2 https://www.simplyrecipes.com/recipes/toasted_pumpkin_seeds/

3 https://www.unep.org/news-and-stories/story/how-composting-can-reduce-our-impact-planet

Disciplinary Core Ideas

PS3.A: Definitions of Energy

- At the macroscopic scale, energy manifests itself in multiple ways, such as in motion, sound, light, and thermal energy.

PS3.D: Energy in Chemical Processes

- Although energy cannot be destroyed, it can be converted to less useful forms—for example, to thermal energy in the surrounding environment.

ETS1.A: Defining and Delimiting an Engineering Problem

- Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. (secondary)

Crosscutting Concepts

Energy and Matter

- Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system.

Connections to Engineering,Technology, and Applications of Science

Influence of Science, Engineering and Technology on Society and the Natural World

Modern civilization depends on major technological systems. Engineers continuously modify these technological systems by applying scientific knowledge and engineering design practices to increase benefits while decreasing costs and risks.

HS-LS2-7 Ecosystems: Interactions, Energy, and Dynamics

Students who demonstrate understanding can:

HS-LS2-7

Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.*

Clarification Statement:
Examples of human activities can include urbanization, building dams, and dissemination of invasive species.

The performance expectations above were developed using the following elements from the NRC document A Framework for K-12 Science Education.

Science and Engineering Practices

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.

- Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.

Disciplinary Core Ideas

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

- Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species.

LS4.D: Biodiversity and Humans

- Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). (secondary)
- Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (secondary) (Note: This Disciplinary Core Idea is also addressed by HS-LS4-6.)

ETS1.B: Developing Possible Solutions

- When evaluating solutions it is important to take into account a range of constraints including cost, safety, reliability and aesthetics and to consider social, cultural and environmental impacts. (secondary)

Crosscutting Concepts

Stability and Change

- Much of science deals with constructing explanations of how things change and how they remain stable.

Additional Science & Engineering Practices Addressed

SEP-1: Asking Questions and Defining Problems
SEP-4: Using Mathematics and Computational Thinking
SEP-5: Constructing Explanations and Designing Solutions

Companion Texts for this study:

- Punkin Chunkin video[4]
- How composting can reduce our impact on the planet[5]

4 https://www.youtube.com/watch?v=dmSyrGsqmg8

5 https://www.unep.org/news-and-stories/story/how-composting-can-reduce-our-impact-planet

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