



Credit to: Marco Uliana / Shutterstock.com



Grade Level Focus:

- K-2

Mathematical Practices Focus:

- 7-Look for and make use of structure

Domain Focus:

- Counting and Cardinality
Operations and Algebraic Thinking

Overview

The purpose of this performance task is to engage students in looking for and making use of structure in order to determine the number of stink bugs on a given picture. The task requires students to have background knowledge of 1 to 1 correspondence and at least some exposure to grouping/chunking objects and amounts. While the lesson is laid out for a whole class instruction, teachers might choose to do this in small groups with specific student groupings in mind.

After a brief review of invasive species and the work of scientists to monitor such creatures, students are provided the problem in the context of supporting invasive species specialists. Working as individuals and then as pairs, students determine the total amount using previous knowledge of patterns such as counting, grouping, or fact families. This makes the task applicable for meeting content standards for Counting and Cardinality and Operations and Algebraic Thinking domains. The task concludes by having student-demonstrated strategies modeled and labeled as a whole group creating strategy posters. An extension to the task would be completing the same procedure but instruct students to use a different strategy represented on the posters.

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K-2 Mathematics Performance Task: Too Many Stink Bugs

Grade Band

- K-2

Mathematical Practices

- 7-Look for and make use of structure

Domain Focus

- Counting and cardinality
- Operations and algebraic thinking

Overview of task

The purpose of this performance task is to engage students in looking for and making use of structure in order to determine the number of stink bugs on a given picture. After a brief review of invasive species and the work of scientists to monitor such creatures, students are provided the problem in the context of supporting invasive species specialists. Working as individuals and then as pairs, students determine the total amount using previous knowledge of patterns such as counting, grouping, or fact families. This makes the task applicable for meeting content standards for Counting and Cardinality and Operations and Algebraic Thinking domains. The task concludes by having student-demonstrated strategies modeled and labeled as a whole group creating strategy posters. An extension to the task would be completing the same procedure but instruct students to use a different strategy represented on the posters.

Learning Goal statement

- Students will look for and use structure such as counting, grouping, and/or fact families in order to determine a total of stink bugs on a given picture.
- Students will represent their thinking using drawings, labels, and/or equations.

Success Criteria:

- I can use what I know to help me solve a new problem.
- I can show my work and explain my thinking.

Step By Step:

1. Materials:

- Technology to show videos/PowerPoint
- Class set of appropriate Student Worksheet (amount [within 10](#) or amount [within 20](#))
- 2-4 copies of appropriate Strategy Recording Sheets (amount [within 10](#) or amount [within 20](#)) (As many copies as you think strategies will emerge)

2. Pre-planning:

- This lesson will include productive discussion that will open opportunities for multiple approaches to a solution. Prepare for this by making predictions about what students come up with based on previous instruction or demonstrated knowledge.
- Decide what image is appropriate to use for your students. (within 10 or within 20)
- Print class set of appropriate image and strategy recording sheets
- Prepare access to materials such as crayons and pencils for use as needed through the task.

3. Introducing the problem

- Display Slide 2 of [Too Many Stink Bugs presentation](#) and Explain:

*“There are so many stink bugs, so we are going to be scientist and count them. We have been given pictures of stink bugs in their **habitat**. We need to figure out how many stink bugs are in the picture and report back our findings. The scientists really want to know how we find the number of bugs in the picture, so you will each get your own picture to show how you found the number of stink bugs.”*

- Display Slide 3 and Explain:

“To help you explain, here are some words you can use to show how you know the number of stink bugs in the picture.” Continue to click through the slide to reveal vocabulary and sentence frames.”

4. Problem Solving

- Allow students ample time to work through the problem as individuals.
- As students are working, circulate the room to ask questions about their thinking. Take note of different strategies students are using. Provide names for the strategy if students are not freely using the name to describe their work. This will be beneficial for the whole class discussion.
- Choose at least 3 students to share their strategies with the whole group. Make sure the strategies demonstrate math learning that align with the learning goals.

5. Resolution and Strategy Sharing

- Display Slide 4 or 5 depending on the image chosen for the group
- Encourage students to use the presented frames and vocab to explain their thinking and strategy.
- As students share their strategy, record their thinking on a Strategy Recording sheet ([within 10](#)) ([within 20](#)). Make sure to name the strategy and provide appropriate labels and steps if necessary.

Accessibility Strategies Used

- Student worksheet and various writing materials allow students to visually represent their thinking.
- Provided sentence frames and vocabulary provide language supports to increase all students' learning and demonstration of understanding.
- For remote learning, Jamboard is a great tool for collecting student thinking. Here is a possible example: tinyurl.com/MPT-Stink Bugs (Make a copy by clicking the three dots in the upper left corner.)

Things to consider

- Choose the appropriate image to meet the grade-appropriate learning target for your students.
- The lesson can be done in a small group setting, with different partnering options. Make those decisions based on the needs of your students.
- There is opportunity for differentiation with intentional grouping of students by skill level, however this is not essential for students to meet the learning targets.
- The lesson can be extended by having students demonstrate multiple strategies for finding the solution before the first whole group discussion or as a Day 2 day activity. Be sure to recognize student strategies for efficiency. For example, marking each bug to indicate it has been counted as one group.

Formative Assessment Process

- Clarify learning targets throughout the lesson. This is specifically done at the beginning and end but is helpful at any point to further students' learning.
- Evidence of student learning is found in multiple areas of the lesson. The individual student worksheets are concrete options. Teacher observations, student questions, and student discussion provide additional evidence of students meeting learning targets.
- Use observations of student thinking and other evidence as an opportunity for purposeful discussions around the math concepts. These can be opportunities to reteach or extend learning of math concepts.
- Feedback based on evidence of student learning should be provided to students throughout the lesson. This can happen as the teacher circulates the room, during class discussion, or on group or individual response sheets.

Extensions and Connections learned from teacher implementation

- Extend student thinking by having students create missing addend problems using the provided images.
- Extend student learning by measuring stink bugs and using the data for various other calculations and comparisons.
- Introduce students to vocabulary of exponential growth.
- Create an outdoor learning opportunity and extension activity by completing a Sit and Spot observation of your local area.
- Connect to school and local gardens with discussion and observation of current insects and identifying the insect's role in that environment.

Samples of Student Work

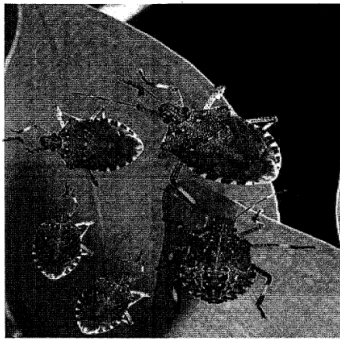


Image created using USDA-ARS photo by Stephen Ausmus.
<https://www.usda.gov/media/blog/2013/09/13/stop-stink-bug-project>

$$3 + 2 = 5$$

my Pattern is 3
Small Stink Bugs
and 2 Big Stink Bug
makes 5 Stink Bugs.

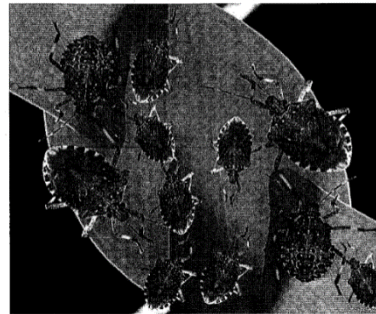


Image created using USDA-ARS photo by Stephen Ausmus.
<https://www.usda.gov/media/blog/2013/09/13/stop-stink-bug-project>

$$4 + 7 = 11$$

my Pattern
is 7 Small
Stink Bugs
and 4 Big
Stink Bugs
makes 11.



K-2 Mathematics Performance Task: Too Many Stink Bugs

Rubric

Rubric Components	Point Scale			Student's Score
	3	2	1	
I can find patterns in the problem.	Able to subitize values and use known math facts to find total.	Determines total of bugs without counting each bug. At least 1 value is subitized. uses a strategy such as counting on or other known math facts.	Requires support to count each bug and reach a total.	
I can use the patterns to find the answer to our question.	Finds correct solution accurately using more than strategy.	Accurately uses 1 strategy such as counting on or other known math facts.	Requires support including the use of concrete objects to find a solution.	



Presentation Material - [PowerPoint Slides](#)

Too Many Stink Bugs

Counting and Cardinality
Operations and Algebraic Thinking
K-2

1

Too Many Stink Bugs

- ▶ Stink Bugs are an **Invasive Species**.
- ▶ They can cause problems by eating important crops and plants.
- ▶ Scientists like [Jennifer Parsons](#) and [Emily Grason](#) help monitor different **invasive species** to make sure our crops, plants and ecosystems stay healthy.



From left to right, four nymphal stages of BMSB (second through fifth instar), adult male, and adult female. Photo by W. Hershberger

2

▶ Learning Goals

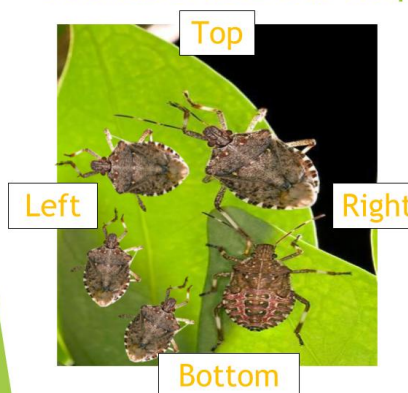
- ▶ Students will understand how to look closely at images to find patterns that will help them find a solution to a given question.

▶ I know I've got it when...

- ▶ I can find patterns in the problem. For example I can see numbers I know or math strategies I can use.
- ▶ I can use the patterns to find the answer to our question.

3

Scientists Need Our Help!



What do you see?

- I see ___ stink bugs at the _____.

How do you know?

- I know that ___ and ___ make ___.
- I know the ___ + ___ = ___.

Image created using USDA-ARS photo by Stephen Ausmus. <https://www.usda.gov/media/blog/2013/09/13/stop-stink-bug-project>

4

Share Your Strategy

Discussion Sentence Frames

- ▶ How many stink bugs do you see?
 - ▶ I see ___ stink bugs.
- ▶ How do you know?
 - ▶ I see ___ stink bugs at the (top, bottom, left, right).
 - ▶ I know that ___ and ___ make ___.
 - ▶ I know the ___ + ___ = ___.



Image created using USDA-ARS photo by Stephen Ausmus.
<https://www.usda.gov/media/blog/2013/09/13/stop-stink-bug-project>

Within 10 Image

5

Share Your Strategy

Discussion Sentence Frames

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- ▶ How do you know?
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 - ▶ I know that ___ and ___ make ___.
 - ▶ I know the ___ + ___ = ___.



Image created using USDA-ARS photo by Stephen Ausmus.
<https://www.usda.gov/media/blog/2013/09/13/stop-stink-bug-project>

Within 20 Image

6

Lesson Resources

- ▶ Student Strategy Recording Sheets (within 10) Slide 7
- ▶ Student Strategy Recording Sheets (within 20) Slide 8



Brown marmorated stink bug *Halyomorpha halys* (Stål). Photo: iStock.

7



Strategy

8

Strategy



9



Student Worksheet: Within 10

Name: _____

Date: _____



Image created using USDA-ARS photo by Stephen Ausmus.

<https://www.usda.gov/media/blog/2013/09/13/stop-stink-bug-project>



Student Worksheet: Within 20

Name: _____

Date: _____




Image created using USDA-ARS photo by Stephen Ausmus.
<https://www.usda.gov/media/blog/2013/09/13/stop-stink-bug-project>

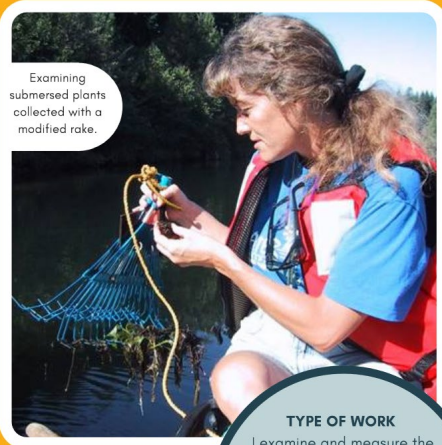


Additional Resources

Career Connections

Jenifer Parsons' career profile card can also be found on the PEI website at <https://pacifieducationinstitute.org/wp-content/uploads/2020/04/Aquatic-Plant-Specialist-Jenifer-Parsons-Career-Profile.pdf>


Environmental Sector 



Examining submersed plants collected with a modified rake.

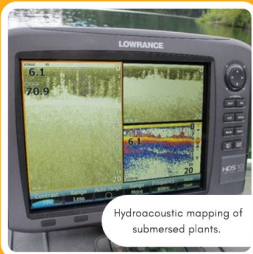
TYPE OF WORK
I examine and measure the aquatic plants in lakes and rivers. When invasive non-native species are found, I monitor the growth and research methods to reduce their impact on native plants.

Jenifer Parsons
Aquatic Plant Specialist
Washington State
Department of Ecology

Aquatic Plant Specialist 

TYPICAL DAY: In the growing season, I assess plants that may be at risk in lakes where invasive species are established. This includes sampling from a boat or by snorkeling and measuring growth using both instruments and direct sampling. In the winter, I analyze the data and write papers and reports.


CAREER PATHWAY:
I always enjoyed being outdoors and had several summer field jobs for various federal agencies as a student and between my bachelors and MS degrees. Therefore, when my current job was open I had the education and years of practical experience to qualify.



Hydroacoustic mapping of submersed plants.

IMPORTANT SKILLS Botanical classification statistically meaningful sampling design, statistical analysis	EDUCATION Master's Degree	TOOLS OF THE TRADE GPS, GIS, data analysis software, hydroacoustic mapping equipment, snorkeling equipment
	SALARY RANGE \$50,000-\$75,000	

"I enjoy being outside and working with other people to reduce the impact of invasive species. It is especially gratifying when results of our efforts restore native plant species in a lake." - Jenifer Parsons

 www.pacifieducationinstitute.org

Emily Grason's career profile can also be found on the PEI website at

<https://pacificeducationinstitute.org/wp-content/uploads/2020/04/Marine-Invasive-Species-Coordinator-Crab-Team-Emily-Grason-Career-Profile.pdf>

Environmental Sector

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Teaching volunteers how to conduct transect surveys using a PVC quadrat

TYPE OF WORK
I run a citizen science program to help monitor Washington shorelines for invasive European green crabs. I train volunteers, analyze data, and coordinate monitoring activities.

Emily Grason
Marine Invasive Species Coordinator - Crab Team
Washington Sea Grant
University of Washington

Marine Invasive Species Coordinator

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TYPICAL DAY: There is rarely a typical day. During the field season, I am often in the mud with volunteers, helping answer their questions, or trapping for crabs myself. During the winter, I spend time analyzing all of the data collected by volunteers, investigating the health of shorelines.

CAREER PATHWAY:
I grew up in Maryland with the health of the Chesapeake Bay often on my mind. After an undergraduate education in biology, I took a position as an Americorps®VISTA at a non-profit for individuals with disabilities. Though it wasn't directly applied to biology, my four years in non-profit administration were the most valuable part of my career experience and directly prepared me to manage volunteers as part of my current job. I returned to school for a Master's and Ph.D. both researching invasive marine species, and joined the project as a student assistant when it started. It's such a great fit I stayed on after graduating.

Scouting a potential monitoring site on San Juan Island.

IMPORTANT SKILLS
Web building,
Statistical analysis, GIS

EDUCATION
Master's Degree

SALARY RANGE
\$50,000-\$75,000

TOOLS OF THE TRADE
Computer, WordPress,
Statistical Analysis Software,
ArcGIS, Social
Media, Quadrat, Transect
Tape, Specialized crab traps,
GPS Units, vernier calipers

"I love getting to share my enthusiasm for marine life with volunteers who are just as excited about worms and crabs in our backyard." - Emily Grason

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Community Resources Connection

Washington Invasive Species Council offers engaging curriculum, educational resources, and an opportunity to participate in Stink Bug data collection through the website or convenient app on your phone.

School Curriculum and Resources: <https://invasivespecies.wa.gov/educational-materials/teacher-curriculum/>

Stink Bug Data Collection Information: <https://invasivespecies.wa.gov/report-a-sighting/invasive-insect>