Abstraction Bridges

We have found that teachers see robotics as offering great opportunities to teach STEM. We also found that many teachers miss these opportunities because solving the robotics project becomes the focus of the class and the STEM concepts in the lesson are either assumed or implied instead of foregrounded, scaffolded and made explicit. In order to foreground the academic STEM content, our team has developed a concept that we call an abstraction bridge. Abstraction bridges are easy for teachers to implement and are designed to:

- *Refocus the teacher and student's attention to the academic component of the problem.*
- *Provide a set of everyday problems designed to develop generalized set of problem solving strategies across multiple contexts for the student.*
- *Provide formative assessment tools for the teacher enabling individualized remediation.*
- *Tie the lesson to outcomes measured by NCL*

Problem: Car A and Car B are leaving the same place and going in the same direction. If it takes Car A 6 hours to get to the destination driving 20 miles per hour, how long will it take Car B to get to the same destination driving 50 miles per hour? *Explain your answer using math and words.*
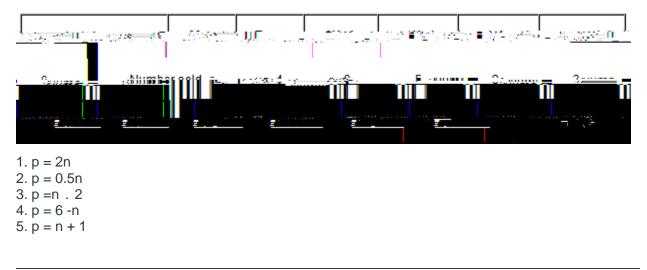

Proportional Equation Example

Directions: Show all work, describe how you got the answer using mathematics and words, and circle your final answer.

Problem: Write an equation for the following statement: *There are six times as many students at this school as there are teachers at this school.* W•^Á‰Ù+Å~[¦Åc@^Á}˘{à^¦Å[~Å•cˇå^}c•Åæ}åÅ‰V+Å~[¦Åc@^Á number of teachers. *Explain your answer using math and words.*

Functional Understanding

Directions: Show all work, describe how you got the answer using mathematics and words, and circle your final answer.

Problem: Angela makes and sell special-occasion greeting cards. The table below shows the relationship between the number of cards sold and her profit. Based on the data in the table, which of the following equations shows how the number of cards sold and the profit are related. *Explain your answer using math and words.*

1. p = 2n
2. p = 0.5n
3. p =n . 2
4. p = 6 -n
5. p = n + 1

Scale Factor Problem Example

Directions: Show all work, describe how you got the answer using mathematics and words, and circle your final answer.

Problem: Roxanne plans to enlarge her photograph, which is 4 inches by 6 inches. Which of the following enlargements maintains the same proportions as the original photograph? *Explain your answer using math and words.*

5 inches by 7 inches | 5 inches by 7 ½ inches