Getting smarter through problem solving
Student Activity Sheet 2; use with *Exploring* "Patterns in problem solving"

1. Consider a sequence of figures constructed from toothpicks. The first three figures in the sequence are shown here.

Figure 1   Figure 2   Figure 3

   a. Generate and record a list of numbers based on this sequence of figures. Your list will contain the numbers of toothpicks needed to construct each toothpick figure, beginning with Figure 1 and continuing through Figure 10.

   b. Now look carefully at your list of numbers. Find and describe in writing as many patterns as you can.

2. There are 125 turtles and 5 snakes at the zoo.

   a. How many animals are in the zoo?

   b. What problem solving skill was required to use to answer this question?

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3. In the previous topic you solved a problem involving bicycles and skateboards. Knowing that you needed 54 wheels for 21 skateboards and bicycles, you determined that Uncle Eddie had 6 skateboards and 15 bicycles. How would the problem change if Uncle Eddie asked Lara and McKenna to order 108 wheels for 42 bicycles and skateboards? Can you determine the number of skateboards and bicycles Uncle Eddie has in his repair shop?

   a. Number of bicycles that need wheels = _____

   b. Number of skateboards that need wheels = _____

4. How are the numbers of bikes and boards in the original problem and the new problem related? How are the numbers of wheels in the original problem and the new problem related?

5. In the original problem, you found that Uncle Eddie had 15 bikes and 6 skateboards. How is the solution to the new problem that you found in question 3 related to the solution of the original problem? Can you express this relationship using the ideas of ratio and proportion?

6. Use proportional reasoning to determine how many bikes and skateboards Uncle Eddie has in his repair shop if he tells the girls he needs 162 wheels for 63 bikes and skateboards.
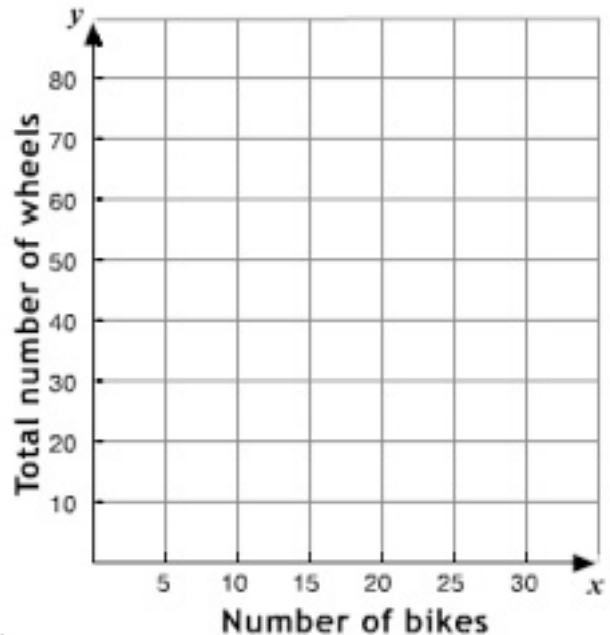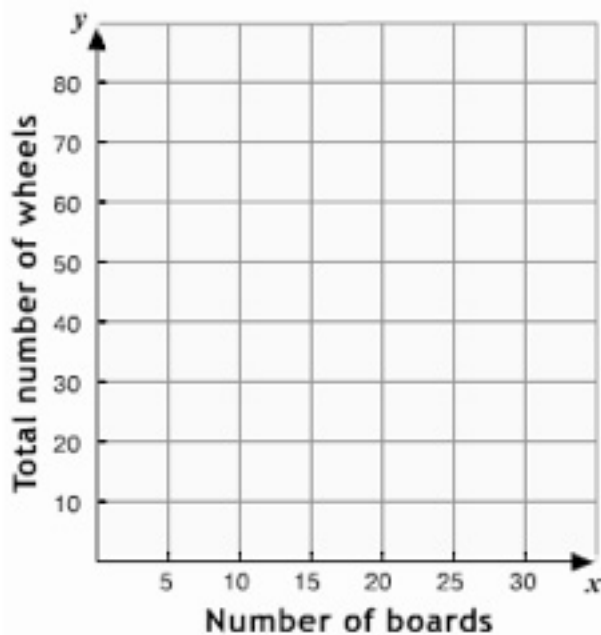
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7. Complete the table to show possible combinations of the 21 bikes and boards, with the number of wheels needed for each combination. Use the Process column to calculate the total number of wheels needed for each combination.

<div align="center">Number of bikes + Number of boards = 21
Total number of wheels = 54</div>

# of boards	# of bikes	Process	Total # of wheels
0	21		
1			
2			

8. Create two graphs to describe the data in the table. On one graph, plot the numbers of boards and wheels. On the other graph, plot the number of bikes and wheels.

Number of boards

Number of bikes

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9. When the number of boards increases by 1, what happens to the number of bikes? What is the net change in the number of wheels?

10. When the number of bikes increases by 1, what happens to the number of boards? What is the net change in the number of wheels?

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11. What is the net change in the number of wheels if the number of skateboards increases by 2? What if the number of skateboards increases by 3?

12. How would you describe problem solving? How do you know when you are problem solving?