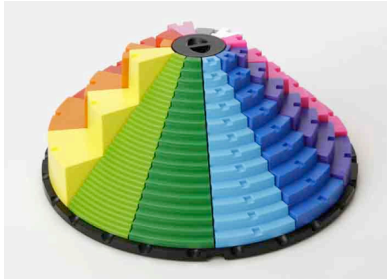


Activity D.4 Model Word Problems Involving Unit Costs		
<p>Special Note: At this stage most students will be working effectively with pencil and paper to solve multiplication and division problems; however some students may benefit from additional work on ZILLIO to model word problems. Work with them one or two at a time to help them learn to interpret problems, organize information and apply skills to solve problems. Use of ZILLIO helps them narrow down the field of numbers from all possible to relevant, helps them visualize the algorithm, and helps them keep track of where they are in the process. It also helps them work with the distributive property to solve the problems.</p>		
<p>Learning Objectives:</p> <ol style="list-style-type: none"> <li>1) Learn how to interpret and model a word problem.</li> </ol> <p>Examples of Skills Accomplished:</p> <ol style="list-style-type: none"> <li>1) If Sheena has \$20 to spend on books and each book costs \$6, she can buy 3 books and will have \$2 left over.</li> </ol>	<p>Setup:</p> <ol style="list-style-type: none"> <li>1) Setup as part of the problem.</li> <li>2) Make a copy of the reproducible for each student you are working with.</li> </ol>	<p>Maximum Number of Players for Small Group Activities: 2</p> <p>Players Positions: Standing</p> 
<p>Review:</p> <p>The key to modeling these problems is to identify:</p> <ol style="list-style-type: none"> <li>1. What is being repeated?</li> <li>2. What number is associated with it?</li> <li>3. What is the limiting element or amount (total funds available)?</li> </ol> <p>Activities:</p> <ol style="list-style-type: none"> <li>1) Give each student a copy of the reproducible.</li> <li>2) For each problem, help students first identify the components of the problem: What is</li> </ol>		

given and what is being asked for. They then need to organize the information given to help them calculate the information being asked for.

- 3) If necessary help students understand that they should model the problem on the staircase that represents the repeating factor (unit cost).
- 4) Using multiplication or division skills, students proceed to answer the question. Some students may first place the number to represent the total funds available (limiting amount) on the staircase representing the unit cost and then identify the number of the repetitions that are less than or equal to the total funds available. Others may use repetitive addition or multiplication and stop when the next step elevation would exceed the total funds available.

Observe and Assess:

- 1) The students' ability to structure the problem.
- 2) The students' ability to perform the calculations.

Group Discussion & Review of Findings:

- 1) Discuss the process and the results with the students.

Transition to Paper:

- 1) Assign the reproducible for either class work or homework.
- 2) Use your own curriculum to give students similar problems. Allow them to structure the problems on Zillio if they prefer. Assist the students in developing a strategy to approach the problems as needed.



Name \_\_\_\_\_ Date \_\_\_\_\_

1) Sheena has \$20 to spend on books. Each book costs \$6. How many books can she buy? Does she have any money left over?

What item is being repeated? Books

What number is associated with it? \$6 per book

What staircase can represent this problem? 6x

Show me how you model this problem: I'll find the quantity of 20 on 6x staircase to represent the number of books Sheena can buy. Sheena can buy 3 books because each costs \$6 and  $3 \times 6 = 18$ . She can not buy a fourth book because she would need \$24 and she only has \$20. Sheena would need \$4 more dollars, because she has \$2 left over.

2) Sam has \$31 to spend on shirts. He wants to buy three shirts. In the mall, each store sells shirts for a different amount. In Store A shirts cost \$7, Store B shirts cost \$8, Store C shirts cost \$9, Store D shirts cost \$10, Store E shirts cost \$11, Store F shirts cost \$12. In which stores can he buy at least three shirts? How much will pay in each of those stores? Does he have any money left over?

What item is being repeated? Shirts

What number is associated with it? Varies by store

What staircase can represent this problem? Staircases 7x through 12x

Show me how you model this problem: I'll put find the quantity of 31 on each of the staircases that represent stores. If there are at least 3 steps below 31 on the staircase ( representing at least 3 shirts), Sam can shop in that store.

	Sales Price of Shirts	Number of shirts that \$31 can buy	How much Sam would spend?	How much would Sam have left?
Store A	7	4	\$28	\$3

Store B	8	3	\$24	\$7
Store C	9	3	\$27	\$4
Store D	10	3	\$30	\$1
Store E	11	2	N/A	
Store F	12	2	N/A	

3) Lyon is collecting used shoes for a charity drive. 8 pairs of shoes can fit in one box. How many boxes does he need if he collects 38 pairs?

What item is being repeated? **boxes**

What number is associated with it? **8 pairs of shoes for each box**

What staircase can represent this problem? **8x**

Show me how you model this problem: **I'll put 5 tokens on the 8x staircase to represent the number of boxes he will need. Lyon needs 5 boxes because each can box can hold 8 pairs. Four boxes can only hold 32 shoes because  $4 \times 8 = 32$ . He needs another box to hold the additional 6 pairs. He has room in the last box for 2 more pairs.**

4) Two friends, Homer and Kenny, decided to make origami cranes to make a mobile. Homer can make four cranes every hour. Kenny can make three cranes every hour. They each work six hours. How many cranes did each of them make? How many did they have altogether?

What item is being repeated? **Cranes**

What number(s) are associated with it? **4 cranes per hour for Homer and 3 cranes per hour for Kenny. The total cranes produced per hour is 7.**

What staircase(s) can represent this problem? **4x and 3x (and 7x)**

Show me how you model this problem: **Each step on the 4x staircase can represents how many cranes Homer produces in one hour (4) and each step on the 3x staircase can represent the number of cranes Kenny produces in one hour (3). By moving up one step for every hour they work (6), it is easy to calculate the total number each produces (24 and 18) respectively. Together they produce 42 cranes in six hours. Using the distributive process, show students how they can use the 7x staircase to look at the total number of cranes produced per hour.**



Name \_\_\_\_\_ Date \_\_\_\_\_

- 1) Denise has 49 cents to spend on apples. Each apple costs 12 cents. How many apples can she buy? Does she have any money left over?

What item is being repeated? Apples

What number is associated with it? 12 cents per apple

What staircase can represent this problem?  $12x$

She can buy 4 apples and will have 1 cent left over.

- 2) Kevin has \$17 to spend on shirts. Each shirt costs \$3. How many shirts can he buy? Does he have any money left over?

What item is being repeated? Shirts

What number is associated with it? \$3 for each shirt

What staircase can represent this problem?  $3x$

He can buy 5 shirts and has \$2 left over.

- 3) Tiger is collecting used eyeglasses for a charity drive. 20 pairs of eyeglasses can fit in one box. How many boxes does he need if he collects 92 pairs?

What item is being repeated? Boxes

What number is associated with it? 20 pairs of eyeglasses for each box

What staircase can represent this problem? None ( will have to draw a picture to model).

He will need 5 boxes because 4 boxes will only hold 80 eyeglasses ( 20 x 4) so he'll use the 5th box to hold the remaining 12 pairs of eyeglasses.

- 4) Two friends, Sally and Karen, decided to raise money by washing dogs. They can charge \$5 per dog. Sally can wash 6 dogs every hour. Karen can wash 8 dogs every hour. How many hours do they have to work to earn \$120

What item is being repeated? Dogs washed

What number(s) are associated with it? 6 (Sally) and 8 (Karen) dogs per hour for a total of 14 dogs per hour.

What pairs of staircase(s) can represent this problem? 6x and 8x

Show me how to model this problem:

By now students should be able to model the problem without ZILLIO. Together Sally and Karen can wash 14 dogs per hour. At \$5 per dog, they can earn \$70 per hour.  $\$120/\$70 = 1.71$  hours or about  $1\frac{3}{4}$  hours to earn \$120.