Activity B.12: Problem Solving with Addition and Subtraction

Special Note: You may use this exercise as a way to introduce skip counting and repetitive addition.

Learning Objectives:

1) Develop and use strategies for whole-number computations focusing on addition and subtraction.
2) Describe quantitative change.
3) Apply and adapt a variety of strategies to solve problems (counting on, addition, repetitive addition/skip counting, subtraction, reasoning).
4) Select and use various types of reasoning and methods of proof.
5) Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.

Examples of Skills Accomplished:

1) 51 – 3 = 48
2) 50 + 5 – 1 = 54

Setup:

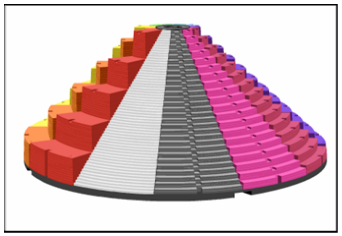
1) Using one foam card (any color) put tokens listed in below on Zillio at the correct elevations.

Staircase	Tokens at their correct elevation
12x	24, 48
11x	11, 33, 55
10x	20, 50
9x	27, 45
8x	16, 32
7x	21, 35, 49
6x	12, 30, 42
5x	15, 25, 40
4x	8, 28, 52
3x	18, 36, 51
2x	n/a

Maximum number of players: 8

Players: Standing

Grey foam logs: In



Review:

1) Explain that the staircases are designed so that any elevation (number) is at the same height for all staircases. Also explain that one token equals one unit of measure. If students know the height of a step, they can find the height of neighboring steps.

Activities:

Hints:

- Remove the 1x if you want to increase the need to calculate elevations.
- Remove the 2x

1) Give each learner a foam card but tell him/her they are allowed to share tokens.
2) Have each learner find an empty notch, figure out what the elevation of that step must be and place a correctly numbered token in the notch. See the chart below for some possible ways learners might calculate the correct elevation for notches A, B, C, and D using addition, subtraction, reasoning, and measuring skills. They may also use skip counting/repetitive addition/multiplication if they have those skills.
3) Have all the learners place as many tokens in the correct place as possible until time is up or they are done, whichever comes first. Any player may work on any step on any staircase. If they need a token they have already used somewhere else, they may ask other players for a specific number.
4) If you wish you can make it a game by having them (as a team) earn a point for every elevation they calculate correctly. They do not get points for the tokens you placed on Zillio as starting clues. If they score more than a certain number of points (you decide based on number of students, skills mastered, time, etc.) allow them to see what is in the treasure trove.

staircase if you want to have fewer tokens in play.

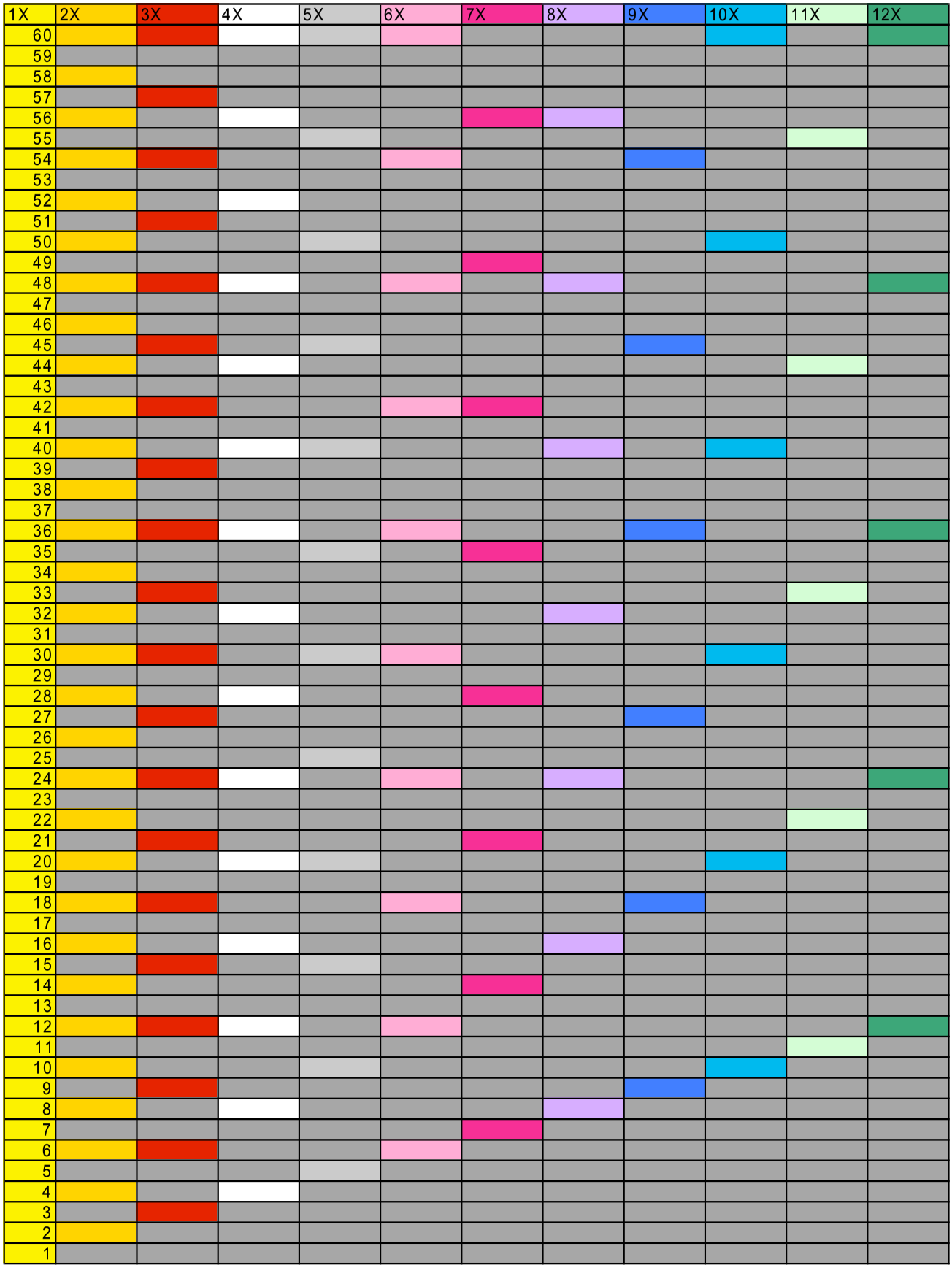
- Once the players have played the game several times, do not put any tokens on Zillio as starting clues. They will need to calculate every step.

1X	2X	3X	4X	5X	6X	7X	8X	9X	10X	11X	12X
60											
59											
58											
57											
56			B=								
55										55	
54					D=						
53											
52			52								
51		51									
50				C=					50		
49						49					
48		A=									48
47											
46											
45								45			
44											
43											
42					42						

Example of how learners might find elevations A-D

A= 48: Using counting down or subtraction skills from 51 on the 3x staircase, 51-3=48.
B=56: Using addition or skip counting add 52+4=56.
C = 50: Using reasoning, C is at the same elevation as 50 on the 1x staircase so C=50.
D=54: Using repetitive addition the next step above C on the 5x staircase is 50+5=55. The step on the 6x staircase is one below that so D must equal 55-1 = 54.

Observe and Assess: 1) Which skills do students use? 2) Have they figured out that they can use repetitive addition and subtraction to solve all problems on a given staircase?	
Group Discussion: 1) Ask students to discuss their strategies for finding the correct elevations. Have they found any short cuts?	
Transition to Paper: 1) Have students work on a 2D worksheet (see downloadable documents on the website) to calculate correct elevations. You may give them specific guidelines such as: i. Find the correct elevation on specific staircases only (i.e.: 3x-7x). ii. Show at least three ways to calculate the elevation of any step. 2) Assign the reproducible for either class work or homework.	


1X
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3X
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5X
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8X
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zillio

a zillion ways to play math

Name: _____ Date: _____

a) 56 - 8 = 48	**b)** 36 - 12 = 24
c) 40 + (3 x 4) = 52	**d)** 10 x 5 = 50
e) 5 x 7 = 35	**f)** 36 + 9 = 45
g) 48 – 24 = 12	**h)** 34 – 2 – 2 - 2 = 28