



### Activity F.8: Avalanche

Special Note: This game is an advanced version of On Belay. Please play that game first before you play this one. This is one of the few games where students are playing against each other.

#### Learning Objectives:

- 1) Ability to use simple math skills to solve strategic problems.
- 2) Fluency in converting improper fractions into mixed numbers.
- 3) Solve multiple step problems

#### Examples of Skills Accomplished:

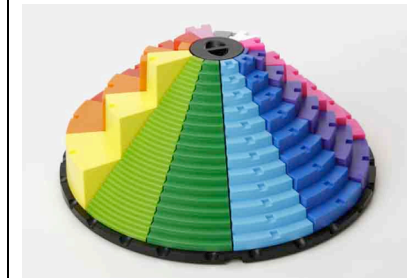
- 1) Maximize move where  $(25/\text{staircase} - r/\text{staircase}) \times \text{staircase} + \text{current elevation on staircase} < \text{lowest climber} + 30$ .

#### Setup:

- 1) Remove the 1x and the 2x staircases.
- 2) Put the remaining staircases in counterclockwise sequence 3x → 12x.
- 3) Use red and blue foam cards for climbers.
- 4) Place a red and blue climber in the notch at the bottom of each staircase. The order of the tokens in the notch doesn't matter.
- 5) Place the gray number 20 token number side up on the 5x staircase at the correct elevation and the gray number 24 token number side up on the 8x staircase at the correct elevation. These tokens will represent the elevations at which can avalanches occur on any staircase.

Maximum Number of Players for Small Group Activities: 2 teams of 2 students

Players Positions: Standing



Game Objective: The Red Team and the Blue Team race to the top of Mount JJ. The team with the most players on top wins.

- 1) One member of each team rolls the die for the team. The team with the highest roll goes first.
- 2) Explain that the term "on belay" means "to secure a person by attaching to one end of a rope". The topmost climber on a team can be no more than 20 elevation points above the lowest climber on the team, because the climbers are tied together. If a team violates this rule, the rope breaks and all of the climbers on the team must

This game was created in collaboration with Jaswin, 5<sup>th</sup> grader, Pacifica, CA.

<p>return to the bottom to start again.</p> <ol style="list-style-type: none"> <li>3) Play begins. Each turn three dice will be rolled (teams will alternate who gets to roll) but each team makes an allowable move by moving one or more climbers up Zillio.</li> <li>4) To calculate possible elevation gains (moves) a team may decide to use any <b>one</b> die or any operation (+, -, x, /) using any <b>two</b> dice. (See chart below for example of possible elevation gains for dice roll of 2, 5, and 6). The team then decides what elevation gain to attempt.</li> <li>5) The team must pick which climber(s) they choose to advance. The total elevation gains of all moves must be less than or equal to the calculated elevation gain they agreed to attempt. Any elevation points they are not able to use on the move must be forfeited. A team may forfeit no more than 18 elevation points during the game. Keep score.</li> <li>6) Climbers cannot land on the same step on the same staircase (except at the top) but they can pass each other.</li> <li>7) Climbers landing on elevations of 20 or 24 (on any staircase) create an avalanche. It is up to opposing teams to spot when a climber triggers an avalanche. That climber and any other climbers on the team currently at elevations over 20 falls back down to the bottom, because the difference in elevation would be greater than 20.</li> <li>8) When a team's climber gets to the top the team gets to name that ascent (trail).</li> <li>9) At the end of play allow members of the winning team to pick out awards.</li> </ol>	<p>For example: A team may attempt an elevation gain of 18 and choose to move up 2 steps on the 7x and one step up the 4x staircase. If the move on the 4x staircase would be illegal because it would exceed the on belay rule (difference between highest and lowest climber would be greater than 20) then the team would forfeit 4 elevation points if it moved the climber on the 7x staircase. They may re-evaluate their planned move and pick another move if they want to avoid forfeiting elevation points.</p>
<p>Observe and Assess:</p> <ol style="list-style-type: none"> <li>1) Players' abilities to optimize moves.</li> </ol>	
<p>Group Discussion &amp; Review of Findings:</p> <ol style="list-style-type: none"> <li>1) N/A</li> </ol>	
<p>Transition to Paper:</p> <ol style="list-style-type: none"> <li>1) N/A</li> </ol>	

For example, if a 2, 5, and a 6 were rolled, the possible elevation gains and moves are:

<b>Dice Used and Operations</b>	<b>Possible Moves (only one per turn)</b>
Single die 2	1 step on 2x
Single die 5	1 step on 5x
Single die 6	3 steps on 2x 2 steps on 3x 1 step on 6x
Sum of 2 + 5 = 7	1 step on 7x
Sum of 2 + 6 = 8	4 steps on 2x 2 steps on 4x 1 step on 8x
Sum of 5 + 6 = 11	1 step on 11x
Subtract 5 - 2 = 3	1 step on 3x
Subtract 6 - 2 = 4	2 steps on 2x 1 step on 4x
Multiply 2 x 5 = 10	5 steps on 2x 2 steps on 5x 1 step on 10x
Multiply 2 x 6 = 12	6 steps on 2x 4 steps on 3x 3 step on 4x 2 steps on 6x 1 step on 12x
Multiply 5 x 6 = 30	15 steps on 2x 10 steps on 3x 6 step on 5x 5 steps on 6x 3 step on 10x
Divide 6 ÷ 2 = 3	1 step on 3x