**Unit: Linear, Modeling Topic: Systems, Constraints, Inequalities Course: \_\_\_\_\_\_ Date: \_\_/\_\_/\_\_**

**Standards: A.CED , A.REI. Source: \_\_http://map.mathshell.org**

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| --- | --- | --- |
|  | Statement(s) | Question(s) |
| Setting up the Problem | Show Boomerang Video of your choice:Play this video and stop at 1:15 (actual instructions on how to throw a boomerang) <http://www.youtube.com/watch?v=TIlKN0j2z6Q>Video with dog bringing the boomerang back:http://www.youtube.com/watch?v=flppsifOIGw Teenager Video Clip with music (add link here from Marilyn)Interesting Boomerang information: * Boomerangs come from Australia where they are used as weapons or for sport.
* When thrown, they travel in a roughly elliptical path and return to the thrower
* Boomerangs are made in many different sizes.
 | * Start on your own for 5-10 minutes
* Have participants work with elbow partners after initial think time
* Sit students in groups of 4
* Calculators and/or graph paper will be helpful for this problem.
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|  |  |  |  |
|  | Anticipated Strategies/Misconceptions | Who | Questions |
| Monitoring Student Work | Misconceptions:1. Incorrect interpretation of constraints or variables
2. Unsystematically approaches the problem
 |  | 1. What figures in the task are fixed? What can be varied?

Why can’t they make 50 boomerangs?1. How do you know for sure your answer is the best option?

Can you organize your work in a table?What would be sensible values to try? |
| Table

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Small | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Time | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 |
| Amt. Money | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 |
|  |
| Large | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Time | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 |
| Amt. Money | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 |

 |  | * What is the table telling you?
* How do you know how many small and large boomerangs should be made?
* If student is not looking at combinations to make 24 hours ask: What if they made one of each size? How much money would they make?
* Will this solution strategy always work?
* What patterns do you notice in the table?
* Is there a mathematical rule for these data sets?
 |
| Graph2x + 3y < 24x + y < 10 |  | * What is the meaning of the intersection?
* What does the shading represent?
* What do your variables represent?
 |
| Algebraic2x + 3y = 24x + y = 10x = 6(solve the system) |  | * What is the meaning of x = 6?
* What do your variables represent?
* Is there a visual representation you can use to show your solution?
 |
| Non Starters |  | * Talk to me about what you have you tried so far?
* What question are we trying to answer?
* What do we know about the problem?
* Would it help to make a table?
 |
| Fast Finishers |  | * Can you use a different method?
* Is this method better than your original one? Why?
* In the problem investigated, how many boomerangs can be made in a month rather than 24 hours?
 |
|  | Parts of Discussion | Questions/Statements |
| Managing the Discussion | Launching the Discussion | * Will someone start us out by sharing one way of working this problem?
* What are some key parts in this problem?
* Was there a point where you felt stuck with this problem? What was challenging?
 |
| Eliciting Student Strategies | * Joe, would you be willing to start us off?
* Can you repeat that?
* Can you explain how you got your answer? How do you know?
* Where did you begin? What did you do next?
 |
| Focusing on Mathematical Ideas | * Does this method always work?
* How is Bob’s method similar to Kelly’s method?
* Where did we see the solution in \_\_\_\_’s table? Do we see the same solution in \_\_\_\_ graph? What is the meaning of the other points?
 |
| Encouraging Interactions | * Do you agree or disagree with \_\_\_’s answer?
* What do other’s think?
* Would someone be willing to repeat what \_\_\_\_ just said?
* Will someone add on to what \_\_\_\_ said?
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| Concluding the Discussion | * What recommendation would you make to Phil and Cath for the amount of Boomerangs to make?
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| Post Lesson Notes |  |