Iowa City Math Club

First Meeting: Wed Dec 2nd

Overall Plan

❑ Starting early January, we will meet once a week

❑ The meetings will happen online until library reopens

❑ I have setup a poll to decide about the day (at the end)

❑ In each meeting, I will introduce you to a concept in math, do sample questions, and give more questions for you to work on at home

❑ Occasionally, there will be other activities and workshops that you can attend

Requirement

❑ Everyone is welcome to attend (No serious prerequisite)

❑ Target students are 8-10 grades

❑ It is OK if you skip classes

❑ Topics in each week can be totally independent and will be repeated over and over

Keys to success:

➢ Spend time on the questions throughout the week

➢ Learn to self-train yourself

➢ It may take many attempts to solve a problem

➢ Don't expect to understand everything that you hear the first time

➢ Remember that math books are not novels, you don't read them continuously!

Did you know!

➢ IMO - style competitions have the following format:

• Exam is held on two consecutive days

• Each day includes 3 questions in 4.5 hours!

• That is 1.5 hour per question

You must learn to be patient and don't give up easily

It can take days, weeks, or months to understand a concept

Topics

❏ We will go over topics in Geometry, Combinatorics, Number theory, Graph theory, …

❏ We will particularly work on proof writing skills

❏ Topics like: Pigeonhole Principle, Induction, Congruence, Matching, Inversion, Strategic games, Diophantine equations, …

❏ Often, you may see problems that do not clearly fall into any category!

Here is the first question/puzzle!

1

is this important or not

❑ A wolf and a 100 sheep play the following game. In each turn, that wolf jumps one yard (or less) in any direction. Then one (and only one) sheep jumps one yard (or less) in any direction. Is it true that the wolf can ALWAYS catch one of the sheep?

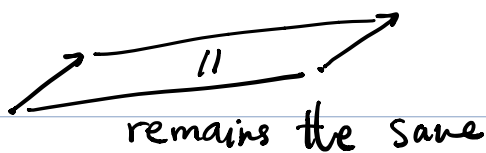❑ ALWAYS means: Wolf has a strategy to win regardless of the initial setup!

<u>True</u>
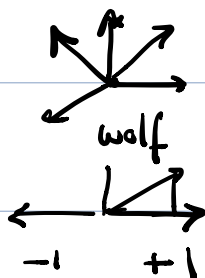
if you want to show it is true :

you must write an argument which is

general in the sense that it works

regardless of the <u>initial position of sheep</u>

<u>Not true</u> : you need to just describe

<u>one</u> scenario that sheep can never be

caught

<u>just 1 sheep :</u>

remains the same

<u>2 sheep :</u> sheep2

wolf

−1   +1

+1
sheep 1

wolf ● ← far away how much?! → : sheep 1
                                      sheep 2

How should you think about this!

❑ Think about the assumptions

❑ Workout some easier versions

❑ Think of techniques you know and may apply: e.g. induction

❑ Ask a friend

❑ Search for answer!

Resources!

- ❑ Books
- ❑ Blogs
- ❑ Google, Wikipedia, Math-Exchange, …

and

- ❑ Iowa City Math Circle: iowacitymathcircle.org

Scheduling

➢ Go to the following link and vote now:

https://forms.gle/HDGZUKRNFw2tzAcYA

Until Next Time

➢ If you had a solution for the Wolf-Sheep problem, write it up and share it with me (by email)

➢ Take a look at Combinatorial Games by Pranav A. Sriram (I will email it to everyone)