General Format

This Mounting Mayhem round is about a type of puzzle called a **Double Choco**. The round consists of some classic Double Choco puzzles, as well as a few original variants that modify the rules of the puzzle slightly.

You will have 15 minutes to read through this rules document, and then 60 minutes to complete the puzzles. The puzzles are divided into five sections:

- **Section 1 (Standard Double Choco)**: 6 puzzles;
- **Section 2 (Desweetful Choco):** 3 puzzles;
- **Section 3 (Triple Choco):** 3 puzzles;
- **Section 4 (Interlocko Choco):** 3 puzzle;
- **Section 5 (Meta Choco):** 1 puzzle.

No partial credit will be given to incorrect puzzles, even if the errors are minor.

It is highly recommended that all members of your team read through all of the provided rules, tips, and examples and perhaps discuss strategies if time allows.

Round Submission

Your team will receive 4 "scratch paper" packets of the puzzles that you can work on to solve the puzzles in the round. You can do what you want with these - split them apart, give one to each team member, etc.

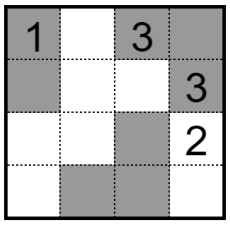
Your team will additionally receive one final answer packet for your team, which will contain a copy of each puzzle from the round - you should NOT take this apart. Additionally, you should only draw over the dotted lines on this sheet once you are confident in your answer. Draw clear, thick lines, and if you have to erase, erase well and neatly! Smudged or confusing lines may result in incorrect grading.

Additionally, certain puzzles will have letters on squares. These are used to fill in the clues in the Meta Puzzle - more information about how that works is explained in the Meta Choco section.

Each puzzle on the answer sheet will have a number of points associated with the puzzle above it. You can use this information to inform your strategies in this round.




1 Introduction to Double Choco



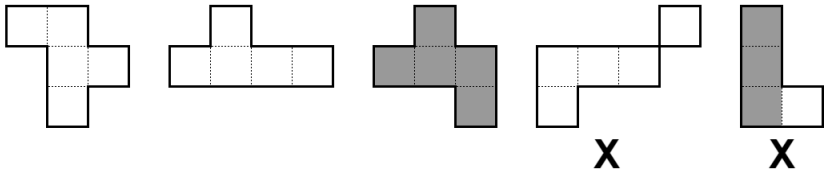
Standard Double Choco is played on a grid with white chocolate (white) squares and dark chocolate (dark gray) squares, with some (or sometimes 0) squares filled in with number clues, as shown in the example puzzle to the right. While classic double choco occurs on a rectangular grid, some later puzzles in this round have non-rectangular grids.

The objective of Double Choco is to draw in borders that divide the grid into sections that follow certain rules.

Choco

A **choco** is any polyomino of the same color: a geometric figure that consists of a group of squares connected together by their edges. The size of a choco is the number of squares it is made of. We can refer to a choco by its size (e.g. a 1-choco, 2-choco, etc.).

For example, the first 3 figures are all chocos of size 5. The fourth figure is not a choco because the square in the upper right corner is not connected by an edge. The fifth figure, while it is a polyomino, is not a choco because it contains two colors.



We say that two chocos are **congruent** when rotations or reflections can be used to make one look the same as the other. Color does not matter for congruency. For example, the first and third chocos above are congruent.

The Rules of Double Choco

Your objective is to divide the grid into **double chocos** that satisfy the following rules:

- **Double Choco Rule**
  A double choco contains exactly two congruent chocos: one white choco and one dark choco, connected by at least one edge.

  Mark your double chocos by drawing its border on the dotted lines. Do **NOT** draw a border line between the white choco and the dark choco in a single double choco.

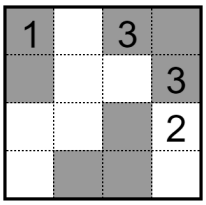
- **Given Numbers Rule**
  A number indicates the size of that color's choco in the double choco. For example, a 2 on a white square indicates that it is a part of a white 2-choco, which, by the Double Choco Rule, is connected to a dark 2-choco.

It is possible for two given squares with matching numbers to belong to the same double choco. It is also possible for a double choco in the solution to have no given number clue at all – these are called "hidden double chocos".

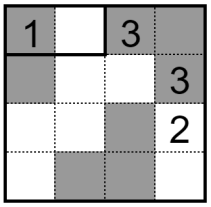
All puzzles in the Puzzle Round have UNIQUE solutions that can be deduced logically. If you believe that there are multiple solutions, it is likely that you have misinterpreted the rules of the puzzle.

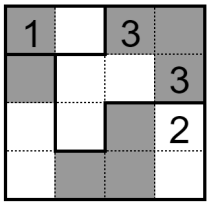
Worked Example

Let's go back to our original Double Choco example and try to find its unique solution. Along the way, we will demonstrate many of the classic techniques used in solving Double Choco puzzles.



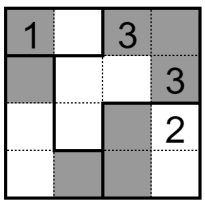
One place to start is to look for clues with the number 1. For example, the 1 in the top left corner means that the dark choco of the double-choco containing that square must be just that square. The white choco of this double choco must also be just a white square. The only possibility is to connect that dark 1 with the white square to its right, forming our first double choco.

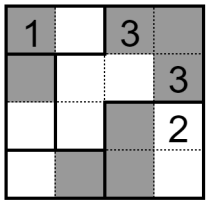




Now examine the 3's in the upper right corner. Since that dark region only contains 3 squares, we know that the two 3 clues must be in the same L-shaped dark choco. Now we can complete the double choco with the only available white congruent choco that shares an edge with this dark choco.

We now focus in on the last given clue - the 2 in row 3, column 4. Since the white region it's in only has 2 white squares, we can be certain that is the white choco of the choco. Now there are two choices for the dark choco: row 4, column 2 with row 4, column 3, or row 3, column 3 with row 4, column 3. Note that the first option would leave the dark square in row 3, column 3 trapped without any adjacent white squares. This means it would fail to be part of a double choco, so we use the second option:



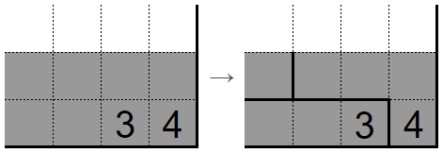


Now we can finish the puzzle by filling in the hidden double chocos.
The rest of the Mounting Mayhem round builds on the mechanics of the Double Choco, so it is a good idea for all members of the team to familiarize themselves with the rules in this section.

Tips

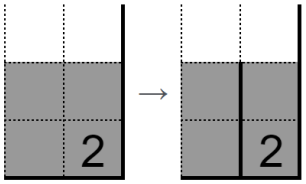
We used a wide variety of strategies above. Let's expand on those and explain a few others:

- **Corralling**
  Sometimes, a partially filled choco will only have 1 way to expand. For example, here the dark 4-choco has only one place to expand, so the square above the number clue 4 must be part of the 4-choco. Then it must also expand leftward because the dark 4-choco can only include dark cells.

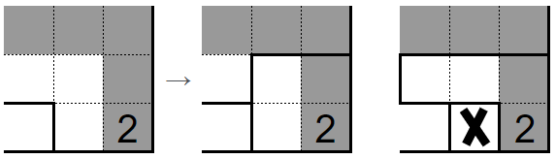


  Even if corralling will not always give you the full choco, partially filling out chocos will help you constrain sizes and shapes of other chocos.

- **Seeing Double**
  To form a double choco, the two colors must be touching. Keep this in mind when extending chocos of a single color. For example, the 2-choco must be like this in order to reach white cells to make a double choco with.

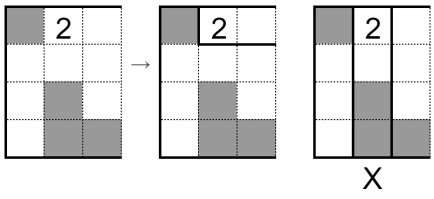


- **No Lonely Chocos**
  To form a double choco, the two colors of chocos need to be touching, so make sure to not isolate squares. We can use this tip to construct the double choco containing the number clue 2 because the white square to the left of the 2 should not be be trapped.



- **Opposite Color Region's Area**
  When constructing the congruent choco of the other color, consider the area of the region you're expanding into. A region with area less than the size of choco you're trying to make will not work, and will limit your double-choco construction.

- **Cutting Off Regions**
  When drawing in borders, make sure that when you surround any region, that region should have the same number of white and gray squares. For example, the 2-choco must extend to the right. Otherwise, the left column would be incorrectly cut off.



- **Count the Squares**
  Counting squares, whether it be for the whole grid or for a smaller enclosed region, can be helpful for determining any connected number clues or hidden double chocos.

- **Guess and Check**
  While it might be helpful to assume things sometimes, you will usually find yourself spending a lot more time using this strategy. You will most likely get stuck using this strategy. All puzzles on the Mounting Mayhem round have a logical route to a solution, so employ this strategy, but with great caution. *Sometimes, it may be hard to see the solution immediately, but you might be able to feel your way to the answer.*

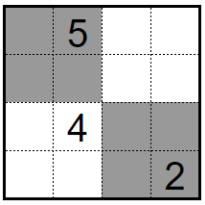
2 Desweetful Choco

Desweetful Choco has the following rules:

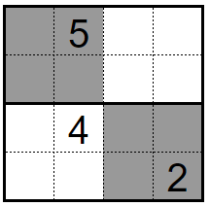
- **Double Choco Rule**
  This is the same as in Standard Double Choco.
- **Desweetful Clues Rule**
  Each given number clue is "desweetful": it is either one greater or one less than the correct size of that choco. For example, a 2 clue in a Desweetful puzzle indicates that it is part of a 1-choco or a 3-choco, but not a 2-choco

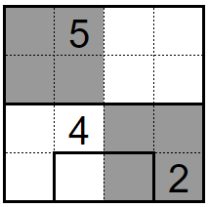
Worked Example

Here is an example Desweetful Choco:



The desweetful clue 5 is in a dark region of size 4, so it must actually be part of a 4-choco. If the white part of its double choco was the lower left, this would be wrong because we know that the desweetful clue 4 is not actually part of a choco of size 4. So, we extend to the upper right:





The desweetful clue 4 is in a region of area 4, so it must actually be 3. The desweetful clue 2 must also be 3 because otherwise it would not be able to connect to a white cell. We can now solve the puzzle as a normal double choco.

Tips

All the tips from the standard Double Choco carry over as well.

- **Surrounding Areas**
  If a number clue n on a certain color is in a region of size less than or equal to n of that color, we know the correct clue is $n - 1$.
- **Seeing Double**
  If a number clue n is on a certain color and all of the possible $n-1$ sized chocos cannot have any square adjacent to the other color, it is certain that the correct clue is $n + 1$.

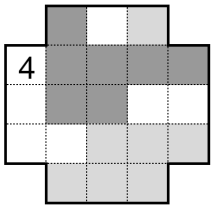
3 Triple Choco

There are now three colors: white, light gray (milk) or dark gray (dark). You will divide the grid into **triple chocos**, with the following:

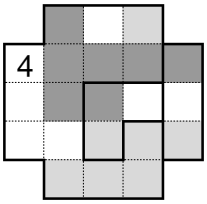
- **Triple Choco Rule**
  A triple chocos must contain exactly one white choco, one milk choco, and one dark choco. All three of these chocos must be congruent and all squares within the triple choco must be orthogonally connected.
- **Given Numbers Rule**
  This is the same as in Standard Double Choco.

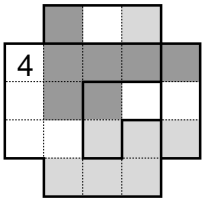
Worked Example

Here is an example Triple Choco:



The white choco with the number clue 4 must connect with a milk choco L shape of size 4. The one that includes the three light-gray squares on the 4th row traps the squares in row 5, column 2 and row 5, column 4, so we know it is wrong. This partial construction lets us find the triple chocos for the light gray squares in row 4, column 3 and row 4, column 5:





Now consider the top row of the puzzle. The white and light-gray cells must be connected. We finish by finding the correct dark-gray square that is part of this triple choco.

Tips

The tips from standard Double Choco still apply.

- **No Lonely Chocos**
  In Triple Choco, there is a greater need for being aware of connecting colors. For example, if you have a milk chocolate choco, it is not enough to only consider connecting to a white choco, since either the milk or white choco also needs to connect to a dark choco.

4 Interlocko Choco

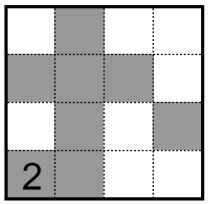
In addition to the rules of Standard Double Choco, we have

- **Interlocked rule**
  There cannot exist a straight line segment with length greater than N. The value of N will be given for each puzzle.

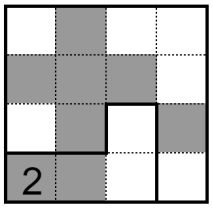
  Line segments here refer to the border lines you draw in. This does not refer to lengths of rectangles within double chocos, nor does it refer to the already existing border of the puzzle.

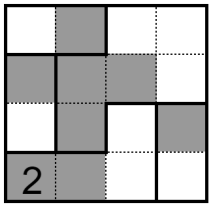
Worked Example

For this interlocko, $N = 2$.



From corralling, the dark 2-choco needs to include the square to the right of the number clue 2. Then if the white 2-choco is horizontal, we would have a line segment of length 4 between the 3rd and 4th rows, violating the Interlocked Rule. So, we draw in the double choco:





Find the double choco containing the white square in the bottom right corner. Now consider the white square on row 3, column 1. If its double choco contained the dark square to its right, we would have a line segment of length 4 between the 2nd and 3rd rows, violating the Interlocked Rule. So, its double choco must contain the dark square above it. We finish the puzzle by corralling in the top left.

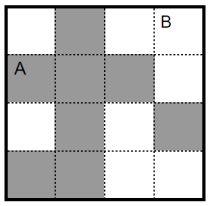
Tips

The tips from standard Double Choco still apply here.

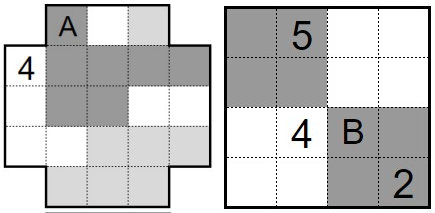
- **Fitting Chocos Together**
  If you have a large choco, think about how the second choco could be connected to the first in order to follow the interloco rule. To lower the length of the line segments, you should generally "interlock" your chocos (hence the name interlocko.)

5 Meta Choco

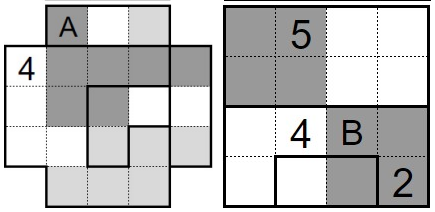
You may notice that some squares of some puzzles in the Mounting Mayhem Round have letters in them. While solving those puzzles, you should ignore those letters. Your Meta Choco puzzle will be an Interlocko. Some squares will have letters in them. These correspond to letters in the previous puzzles; replace each letter in the meta with the size of the choco (NOT the double choco) in the earlier feeder puzzle that contains the letter. If the feeder puzzle is a Desweetful puzzle, make sure that you use the size of the single choco and not the given clue.
For example, if this $N = 2$ Interlocko was the meta:



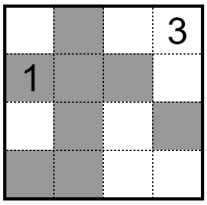
And these Triple Choco and Desweetful Choco puzzles were feeder puzzles:



We would first solve the feeder puzzles, ignoring the letters.



A's choco has size 1, and B's choco has size 3. So we can fill in the number clues in the Meta:



The more puzzles you solve, the more likely it is that you can solve the Meta Choco! All feeder clues are not required to solve the meta correctly, but the meta only has ONE UNIQUE SOLUTION - if you are finding multiple, then you don't have enough clues yet!

Wrapup

Great! You should be all set for the Mounting Mayhem Round now. If the reading period is not over yet, consider rereading key sections, looking through examples or discussing strategies with your team. Good luck!