30th
WORLD PUZZLE CHAMPIONSHIP

INSTRUCTION BOOKLET
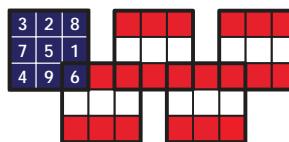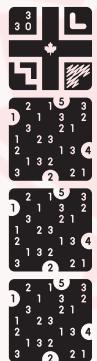
30th **PUZZLE**
16th **SUDOKU**
**WORLD CHAMPIONSHIPS**

www.wspc2023.com

October 19
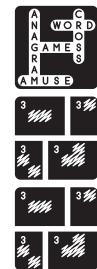
	08:45 - 09:45	Individual Round 1: Welcome to Canada (600 points)
	09:50 - 10:35	Individual Round 2: Jacob E. Funk (450 points)
	10:45 - 11:35	Individual Round 3: Niagara Falls (500 points)
	11:40 - 12:20	Individual Round 4: The Road to GMPuzzles (400 points)
	14:00 - 14:35	Individual Round 5: American Stars (350 points)
	14:40 - 15:15	Individual Round 6: North American Siblings (350 points)
	15:25 - 16:15	Individual Round 7: A Galaxy Far, Far Away (500 points)
	16:35 - 17:20**	Team Round 8: Aha Moments (1800 points)
	17:30 - 18:15**	Team Round 9: Red and Blue (1800 points)

October 20

	09:00 - 09:50	Individual Round 10: Words CAN Define US (500 points)
	10:00 - 10:40	Individual Round 11: What is the Meaning of Aqre? (400 points)
	10:50 - 12:05	Individual Round 12: Stretching our Legs (750 points)
	13:45 - 14:50	Individual Round 13: Islands of Insight (700 points)
	14:55 - 15:35	Individual Round 14: Melon's Puzzles (400 points)
	15:45 - 16:50	Individual Round 15: All Over the Map (650 points)
	16:55 - 18:00	Individual Round 16: The Breadth of America (650 points)
	18:10 - 18:40**	Team Round 17: Canadian Summits (1200 points)
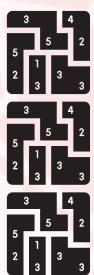
October 21

	09:00 - 09:40	Individual Round 18: Roger's Bag (400 points)
	09:50 - 10:35	Individual Round 19: Holesome Diet (440 points)
	10:45 - 11:45	Individual Round 20: Pentominous+ (600 points)
	13:45 - 15:00**	Team Round 21: Trick or Treat (2500 points)
	15:10 - 15:40	Team Round 22: Ceremonial Folding (? points)
	16:00 - 17:45	Individual Round 23: Genre-specific mini-playoffs

* 10 points per minute bonus for all individual rounds.
** approximate times; team rounds will be allowed to run until at least 2 teams are finished.

COMPETITION RULES

Competition Rules

(These rules have been mostly taken from prior World Puzzle Championships with only minor adaptations.)

Individual Competition

The individual competition is based on 17 rounds, starting with a Welcome to Canada round featuring multiple genres of classic puzzles.

The main part of the tournament is structured around five genre areas: Number Placement, Object Placement, Shading, Loop/Path, and Region Division. Each genre set has three rounds, including one classic round focused on a single puzzle type created in North America or further popularized in North America, specifically:
- Cross Sums - Canadian invention by Jacob E. Funk
- Star Battle - Dutch invention by Hans Eendebak, popularized in The New York Times
- Aqre - US invention by Eric Fox
- Castle Wall - US invention by Palmer Mebane
- Cave - Japanese invention by ゲサクですよ/Nikoli, popularized by GMPuzzles
- In addition to these classic rounds there is a "variations" round playing with the normal solving form of classic grids, and then a "hybrids" or "new puzzles" round with more unusual experimentation. The remaining round is a word placement round featuring several different classic styles and variations on them, themed for this championship.

The title of World Puzzle Champion and the rest of the podium positions will be determined by the individual scores from these 17 rounds. In the case of a tie, rankings will be broken first by comparing the aggregate scores in the five genre sets (Rounds 2-4, 5-7, 11-13, 14-16, 18-20) with the player having more genre wins (e.g., 3 vs. 2) having the higher ranking. This comparison holds for two or even more players in the same tie. Following this comparison, scores on Rd 10, Rd 1, and then a special tie-breaking puzzle will be used to separate the players.

We are not holding a general playoff for the WPC title because we find the broad nature of this tournament cannot always be easily reduced to a satisfactory, short, and representative playoff, in contrast to a single-puzzle type focused event like the World Sudoku Championship. However, we do find it appropriate to try to award more genre-focused prizes and we will be holding "mini-playoffs" in each of five main genre categories. The top three finishers in Number Placement (Rounds 2-4), Object Placement (Rounds 5-7), Shading (Rounds 11-13), Loop/Path (Rounds 14-16), and Region Division (Round 18-20) will be invited to play in a three puzzle playoff in front of an audience to determine the best solvers of these puzzle styles. In the case of a tie between players, the appropriate rounds will be considered in increasing order (e.g., Round 2 score before Round 3 score). If needed a special tie-breaking puzzle will be used in the relevant genre.

In the mini-playoffs, the three players will all start at the same time. The three puzzles will be solved and judged in order. When a competitor solves a puzzle, he or she will submit the puzzle to their grader and will then wait for 30 seconds while grading is completed. If there is any mistake in the solution, the grader will return the puzzle. The competitor will have to fix any mistake and resubmit the puzzle, waiting for an additional 30 second period while it is graded. After the first person finishes completely, the round will be ended and new champions titled (e.g., "World Shading Puzzle Champion").

COMPETITION RULES

Team Competition

In addition to the individual competition, teams of four will be challenged by a total of five team rounds. These rounds come in multiple styles that will require strong teamwork, communication, creative thinking, and puzzle solving skills to do well.

Extra time is being held for the team rounds (except for round 22) to ensure multiple teams finish each of the rounds. If no two teams have finished with perfect marks before 5 minutes are left on the clock, then the clock will be paused at 5 minutes until (1) two teams finish and are judged correct, or (2) a total of fifteen extra minutes have passed. This extra time has been successful in past World Sudoku and Puzzle Championships (notably WSC5 in Philly) where team round timing can be challenging for organizers to manage perfectly.

The total sum of scores from the team rounds as well as the four individual members of the team will be used to determine the top three teams at the 30th World Puzzle Championship. Tie-breaking for teams will be conducted as for individuals, starting with comparing the aggregate team scores in the five genre sets to see which team has more "wins" over the other team(s) by genre.

Marking and Bonus

Points will be awarded only for correctly solved puzzles unless otherwise indicated.

In Individual rounds, if a player finishes all puzzles correctly then a bonus of 10 points per minute will be awarded for each full minute saved. In team rounds, a bonus of 40 points per minute will be awarded to teams for each full minute saved.

If a single "minor" error (as determined by the judges) is present in a round submitted for bonus, 60% may still be awarded to the competitor or team.

COMPETITION RULES

Competition Hall Rules

1. All competitors have to sit at their pre-allocated desk in individual rounds. Teams have to work at their pre-allocated desk area for team rounds.
2. Prior to the start of each round, competitors must ensure they are at their desks ready for the start of the round. Late arrivals may not be permitted to enter the competition hall to take part in a round (at the discretion of the organizers).
3. Prior to the start of each round, competitors should clearly write their name and team on the front page of their competition booklet in the allocated space. If this information is not complete, then the organizers reserve the right not to award any points to that competitor for that round.
4. Competitors must not open their booklets before the official start of the round. Only when the signal for the start of the round has been given, competitors may open their booklets and begin solving the puzzles.
5. During each individual round, competitors have to keep silent, unless declaring completion of a round.
6. During team rounds (except for the individual part of team round 8), team members may talk to each other, but should do this with respect to other teams.
7. Puzzles can be completed in any order within a round. The point value of a puzzle is an indication of its expected difficulty, although individual solving experience may differ. The difficulty of an example puzzle does not necessarily reflect the difficulty of the corresponding competition puzzle.
8. The official puzzle booklets will not contain puzzle examples. Competitors are allowed (and encouraged) to bring the Instruction Booklet to their desk as it contains examples for almost every puzzle which will be part of the championship.
9. When a competitor believes that there is a problem with a puzzle, they must clearly state that puzzle is wrong by writing "Wrong puzzle" next to it. The competitor must not notify the organizers during the round. This will be investigated upon completion of the round.
10. To declare a round complete, a competitor must close their booklet, clearly state "finished" and raise their arm with the booklet. The competitor's arm must be raised until the booklet is collected. The same rules apply for the team competition.
11. Competitors or teams who complete a round with more than five minutes in advance, are allowed to leave the competition hall quietly. However, competitors or teams who complete a round with five minutes or less left are not allowed to leave their desks or tables in order to cause no unnecessary disruption to fellow competitors.
12. If a competitor leaves the competition hall for any reason, they may not be allowed to continue in that round (at the discretion of the organizers).
13. When the signal is given that the round is finished, competitors have to stop solving immediately, close their booklets, put their pens or pencils down and remain seated until all booklets have been collected. The signal to get up and leave will be given by the supervisor.
14. Mobile phones and electronic devices are not permitted to use in the competition hall. The devices have to be turned off and must not be placed on the competitor's desk.
15. Only team captains and official observers equipped with a name tag are allowed to enter the competition hall while either individual or team rounds are taking place. Other non-competing participants may enter the competition hall at the discretion of the organizers.
16. Competitors may not use cameras or other recording devices during rounds. Only official observers may do so, at the discretion of the organizers. They have to respect the competitors and not use flash photography or cameras with excessive sounds.

COMPETITION RULES

Permitted items

1. Permitted items which can be used in the competition hall are: pens and pencils (except that no red pens or pencils can be used), pencil sharpeners, erasers, rulers, and instruction booklets annotated with notes regarding puzzle instructions.
2. Drinks and snacks are permitted as long as they do not disturb other competitors with a strong smell or rustling packet.
3. It is strictly forbidden to use electronic devices such as music players and headphones or any type of calculator. Use of such equipment may lead to the disqualification of the competitor.
4. Any other items brought into the hall must be kept in a bag on the floor and placed under the competitor's desk, so as not to block the aisles.

Marking and Queries

1. When a round has been evaluated, fully marked booklets are returned to a team member (i.e., captain) marked with a country tag at a given location in a given time. Country tags will be distributed to each captain prior to the start of the championships.
2. In case of any query after a booklet has been evaluated and returned to a competitor, the query must be raised through a team member with country tag to the organizers in the specified time. The schedule for the queries will be published before the competition. The booklet should be left with the organizers for investigation.
3. Puzzles may be photographed during the marking phase in order to prevent subsequent interventions.
4. Team captains are responsible for ensuring that any information given to them related to the competition is effectively shared to their team.
5. Any breach of these rules may lead to penalty points, or in severe cases to a competitor or team being disqualified from the round or competition.
6. If there is any inconsistency between this Instruction Booklet and the official puzzle booklets, such as puzzle points, the information in the printed Instruction Booklet given out to competitors in Toronto will be considered valid.
7. The decision of the WPC tournament director (Serkan Yürekli) is final.

Credits

Authors (and often sources) for the example puzzles in the Instruction Booklet have been shared. All GMPuzzles examples are shared under a Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported license.

We would like to thank the many past WSC/WPC hosts for some of the rules and structure that inspired our tournament.

Puzzles for the WPC were created by the following designers in alphabetical order (authors will be listed in the solutions booklet only, not in the competition booklet):

JinHoo Ahn, Cihan Altay, David Altizio, Fatih Kamer Anda, Roger Barkan, Alan Fetters, Grant Fikes, Jonas Gleim, Elyot Grant, Jamie Hargrove, Bryce Herdt, Zoltán Horváth, Joseph Howard, Craig Kasper, Ashish Kumar, Palmer Mebane, Michael Rios, Takeya Saikachi, Mike Selinker, Thomas Snyder, Adam R. Wood, Serkan Yürekli

OCTOBER 19

08:45 - 09:45

1. WELCOME TO CANADA
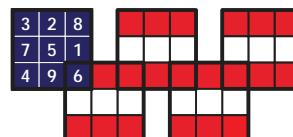
1.	TomTom	40
2.	TomTom	45
3.	Battleships	20
4.	Battleships	25
5.	Kurotto	35
6.	Kurotto	155
7.	Fillomino	25
8.	Fillomino	145
9.	Yajilin	35
10.	Yajilin	75

GRANDMASTER PUZZLES

www.GMPUZZLES.com
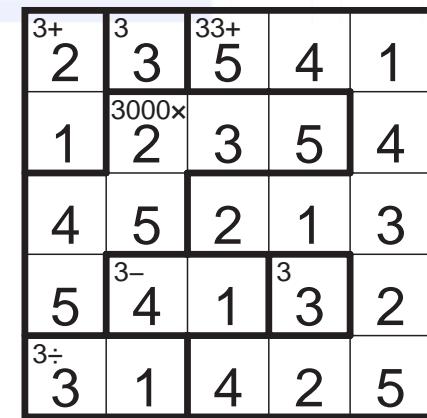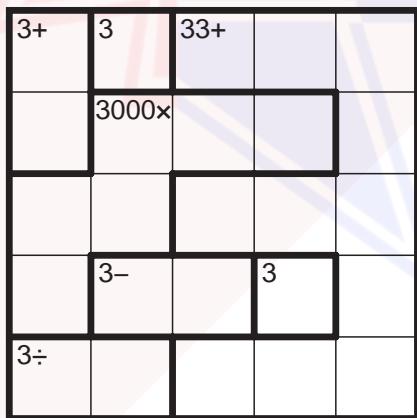
TEAM **USA**

1.1, 1.2 TomTom (40, 45 Points)
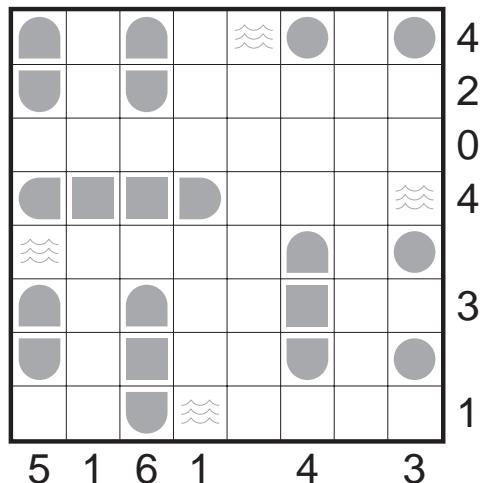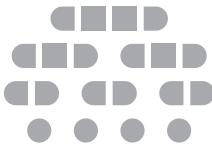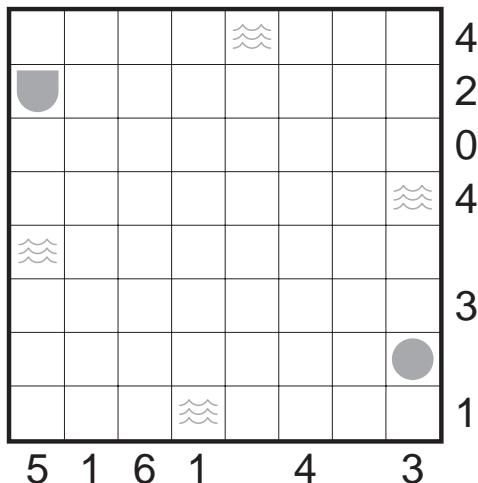
Example by Thomas Snyder (GMPuzzles.com)

Insert a number from 1 to N into each cell in the N by N grid so that no number repeats in any row or column. Also, the number in the upper-left corner of each bold cage indicates the value of a mathematical operation (addition, subtraction, multiplication, division) applied successively to all numbers in the cage, starting with the largest number for subtraction and division (e.g. 1,2,4 with subtraction is a 1- clue as 4-2-1 = 1). The operation may or may not be given in the cage, but at least one of the four operations must apply. Numbers can repeat within a cage.

{1–5}

1.3, 1.4 Battleships (20, 25 Points)

Example by Serkan Yürekli (GMPuzzles.com)

Locate the indicated fleet in the grid. Each segment of a ship occupies a single cell. Ships can be rotated. Different ships cannot be placed in adjacent cells that share an edge or corner. Some ship segments, or sea cells without any ship segments, are given in the grid. The numbers on the right and bottom edges of the grid reveal the number of ship segments in that row or column.
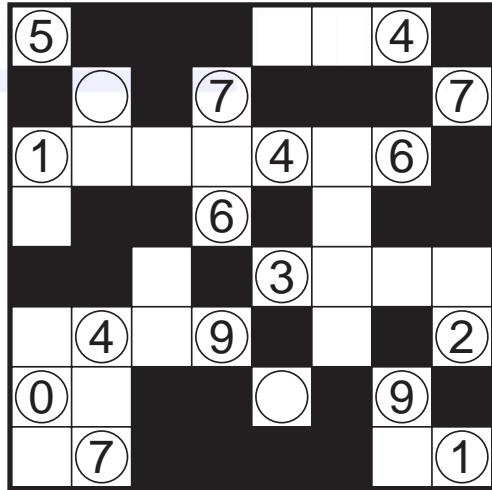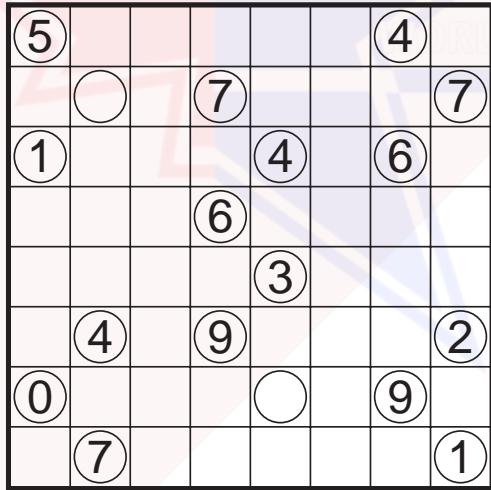
1.5, 1.6 Kurotto (35, 155 Points)

Example by Serkan Yürekli (GMPuzzles.com)
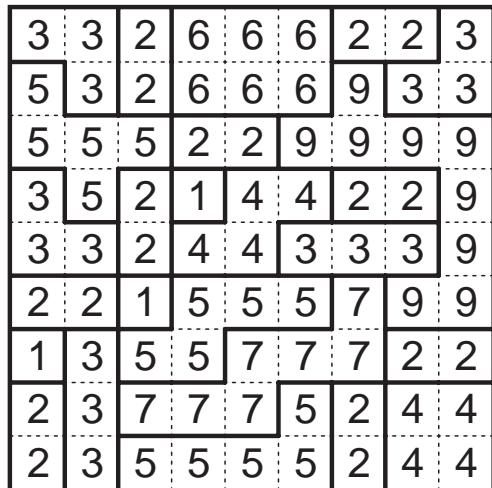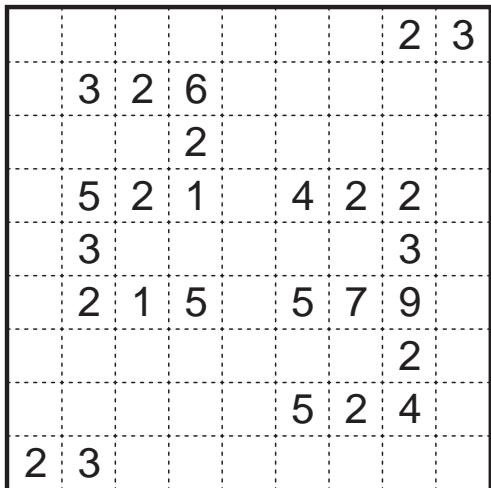
Shade some cells so that each circled number represents the total count of shaded cells in connected groups sharing an edge with that number. Cells with circles cannot be shaded.

1.7, 1.8 Fillomino (25, 145 Points)

Example by Thomas Snyder (GMPuzzles.com)

Divide the grid along the dotted lines into regions called polyominoes so that no two polyominoes with the same area share an edge. Inside some cells are numbers; each number must represent the area of the polyomino it belongs to. A polyomino may contain zero, one, or more of the given numbers. (It is possible for a "hidden" polyomino — a polyomino without any of the given numbers — to contain a value that is not present in the starting grid such as a 6 in a puzzle with only 1-5 clues.)
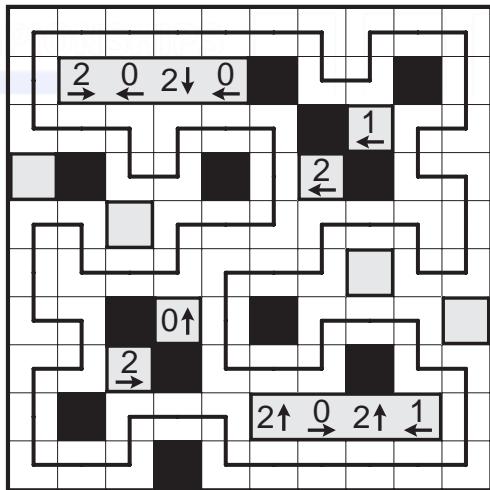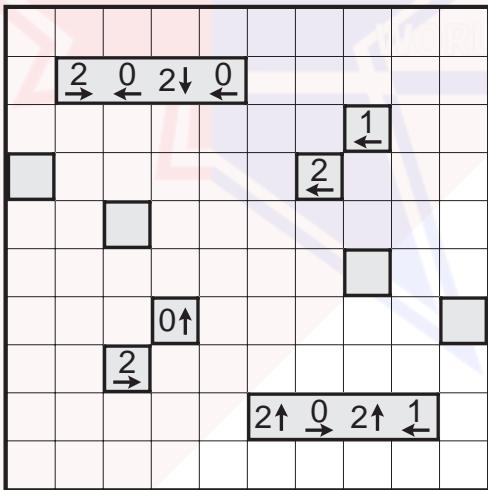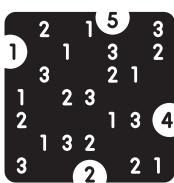
1.9, 1.10 Yajilin (35, 75 Points)

Example by Prasanna Seshadri (GMPuzzles.com)

Blacken some white cells and then draw a single closed loop (without intersections or crossings) through all remaining white cells. Blackened cells cannot share an edge with each other. Some cells are outlined and in gray and cannot be part of the loop. Numbered arrows in such cells indicate the total number of blackened cells that exist in that direction in the grid.
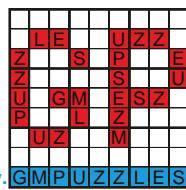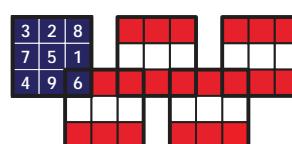
2. JACOB E. FUNK

1. Cross Sums	25
2. Cross Sums (Invisible Doubles)	40
3. Cross Sums	60
4. Cross Sums (Gapped)	85
5. Cross Sums (Thermo)	100
6. Konkat-kuro	140

GRANDMASTER PUZZLES

www.GMPUZZLES.com
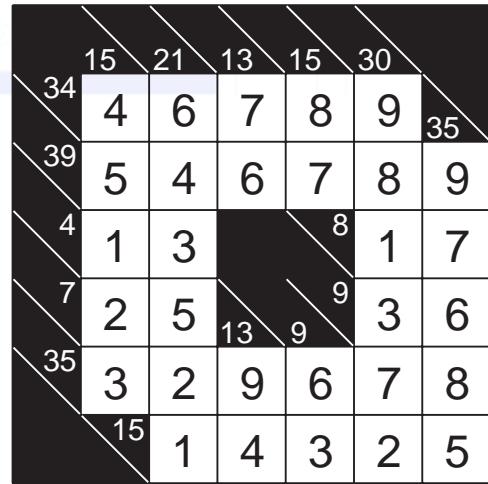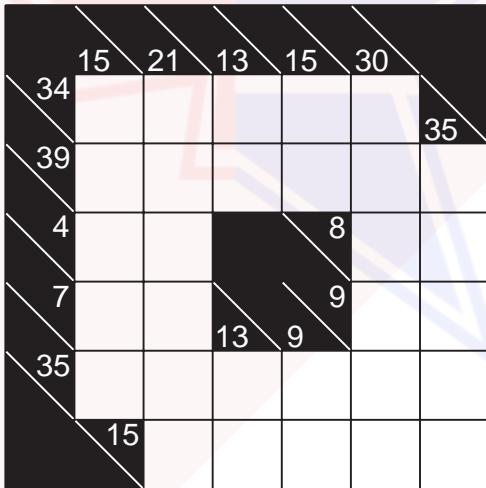
TEAM **USA**
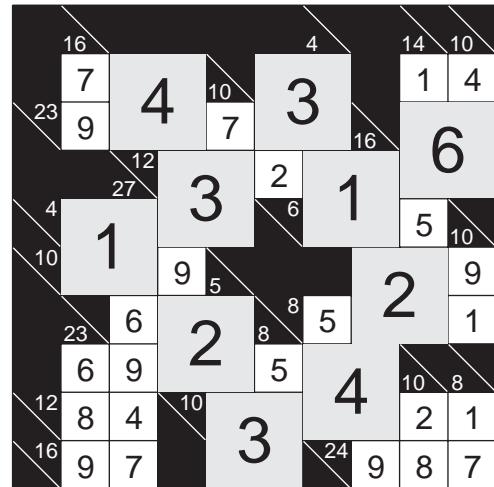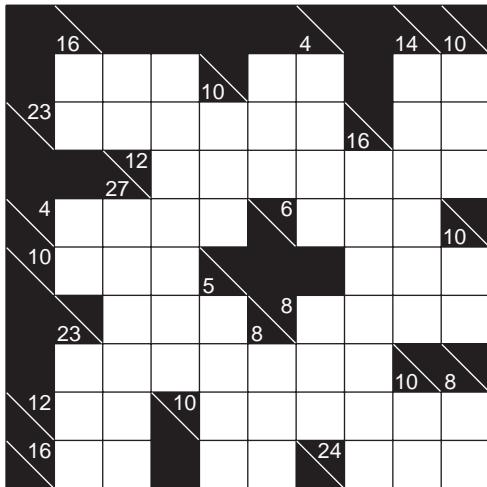
2.1, 2.3 Cross Sums (25, 60 Points)

Example by Thomas Snyder (GMPuzzles.com)

Enter a single digit from 1 to 9 into each white cell so that the sum of digits in each Across entry equals the value given to the left of the entry, and the sum of digits in each Down entry equals the value given above the entry. No digit may be repeated within a single entry (i.e., group of cells connected horizontally or vertically without any black cells between).

2.2 Cross Sums (Invisible Doubles) (40 Points)

Example by Grant Fikes (GMPuzzles.com)
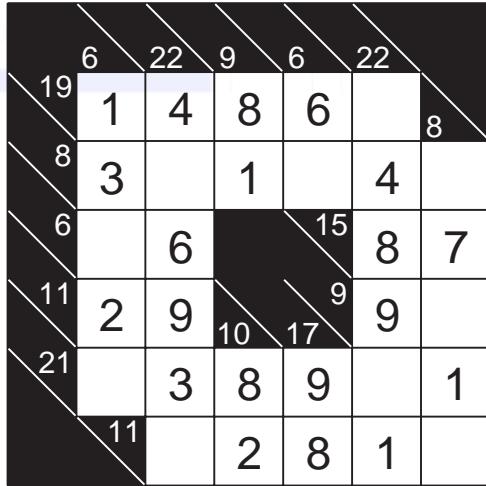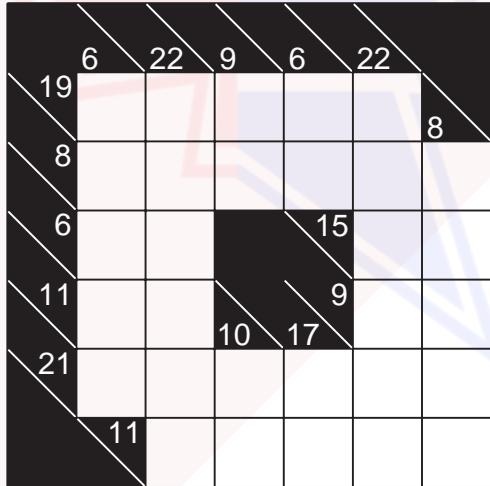
Variation of Cross Sums. Some 2×2 white regions are to be shaded gray and treated as single 2×2 cells. The position of these cells must be found while solving, and each gray cell is to be filled by a single digit which sits in multiple rows and columns. No digits can repeat within an entry, regardless of whether they are in small or large cells.
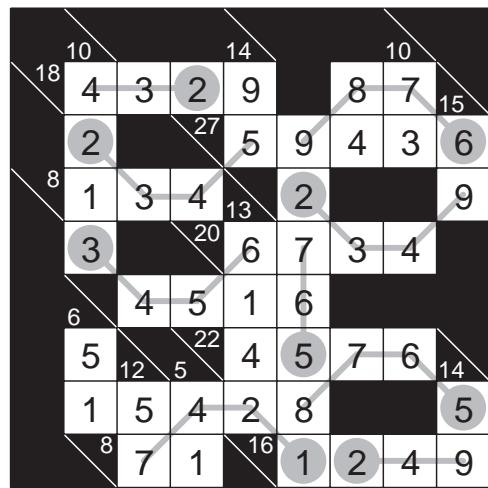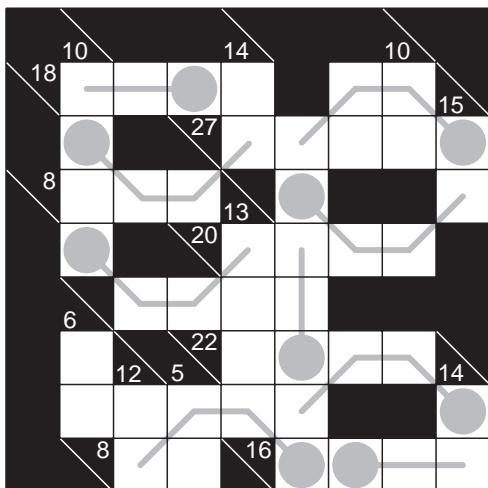
2.4 Cross Sums (Gapped) (85 Points)

Example by Serkan Yürekli (GMPuzzles.com)

Standard Cross Sums rules. Also, some cells may remain empty but empty cells cannot share an edge with other empty cells.

2.5 Cross Sums (Thermo) (100 Points)

Example by Serkan Yürekli (GMPuzzles.com)

Standard Cross Sums rules. Also, some thermometer shapes are in the grid; numbers must be strictly increasing from the round bulb to the flat end.
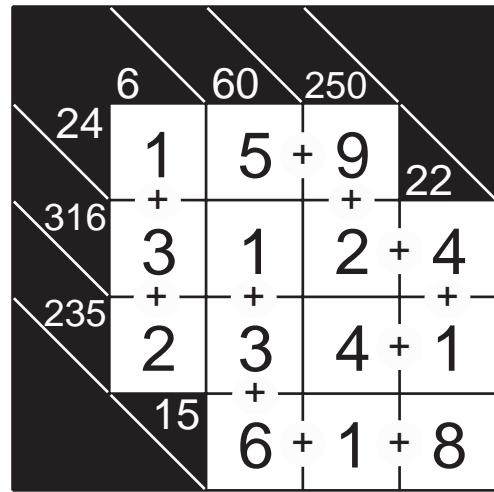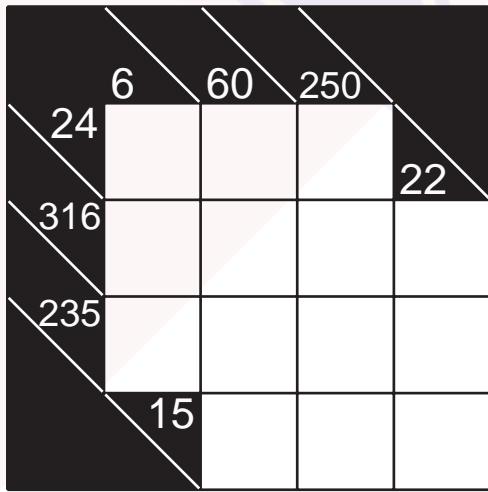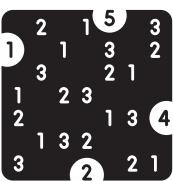
2.6 Konkat-kuro (140 Points)

Variation of Cross Sums. Unlike a standard Cross Sums, where a plus sign is always inserted between all adjacent digits, here a sum may be formed from multi-digit numbers after concatenation, but in each case at least one + sign must be used. In other words, a 24-clue in three cells can be satisfied by an entry like 987 (as 9+8+7 = 24) or 519 (as 5 + 19 = 24) but a 16-clue in two cells cannot be satisfied by 16, since that does not use any addition. Each entry must be able to be formed in only one way (e.g., 40 cannot be written as both 23+17 and 2+31+7).

Note: There is no need to have + signs in your solution, only that all cells are correctly filled with numbers.
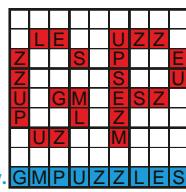
3. NIAGARA FALLS
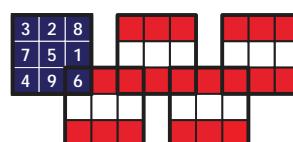
1. Skyscrapers (Gap)   30 + 30

2. Smashed Sums   70 + 70

3. Top Heavy Number Place (First Seen)   70 + 70

4. Easy as Japanese Sums   80 + 80

GRANDMASTER PUZZLES

www.GMPUZZLES.com

TEAM **USA**
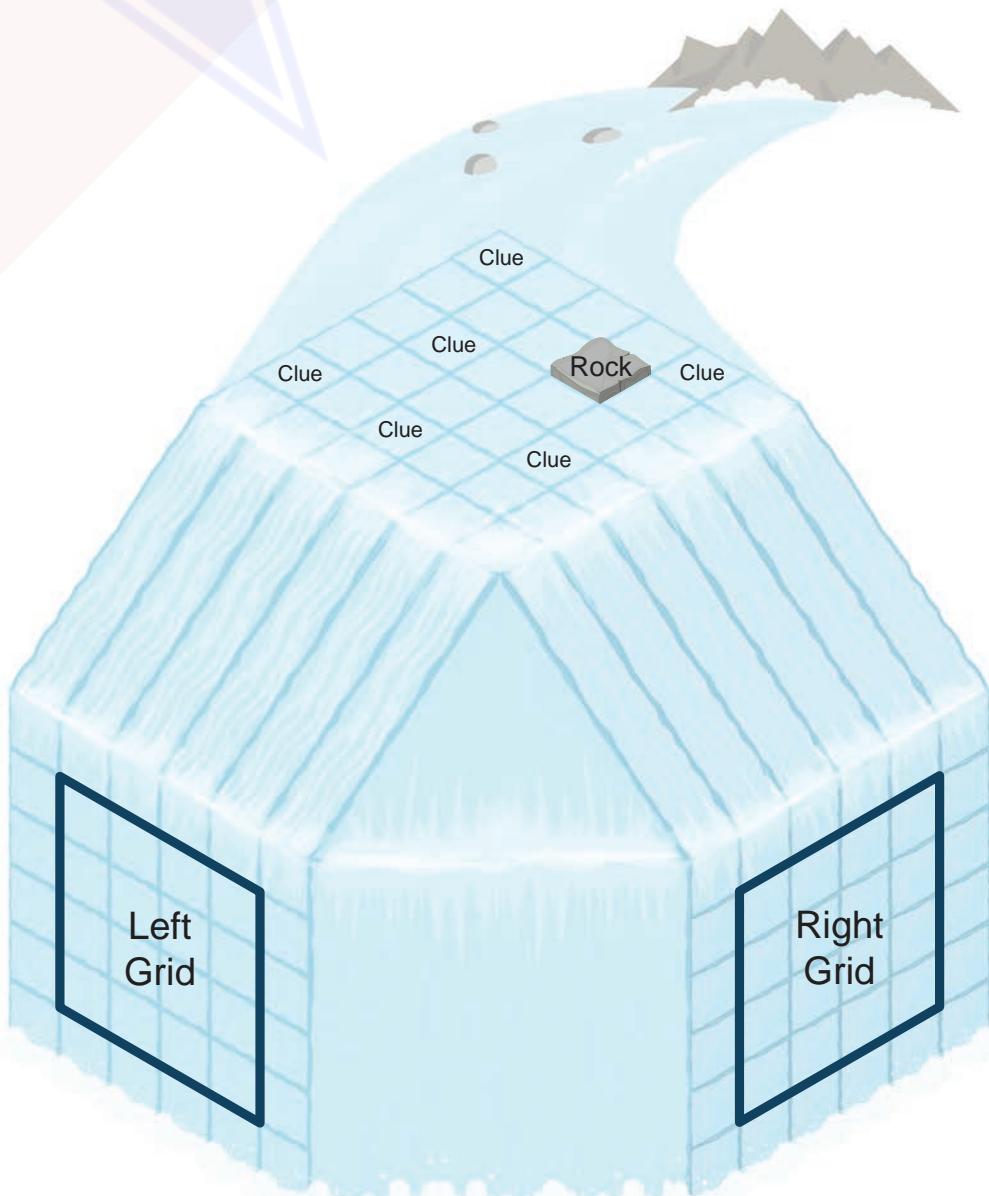
Rules

Each number at the top is drawn along either the left or right side of the waterfall and these numbers —together with the frames—create two separate puzzles. Solve these puzzles, where the outside clues might not necessarily be determined exactly, but the solutions in the frames themselves are decisively settled (such ambiguities are given as light colored-dashed numbers in the example solutions).

Numbers flow straight through their own passages (no meandering), and may stop at any vacant cell, but not on or beyond a given rock (this does not apply to the rocks located during the solving; it only applies to the given rocks). Numbers may pass each other freely, but they cannot land on the same cell, or a cell inside a frame. Every one of these drawn-along numbers must serve as an outside clue to a puzzle.
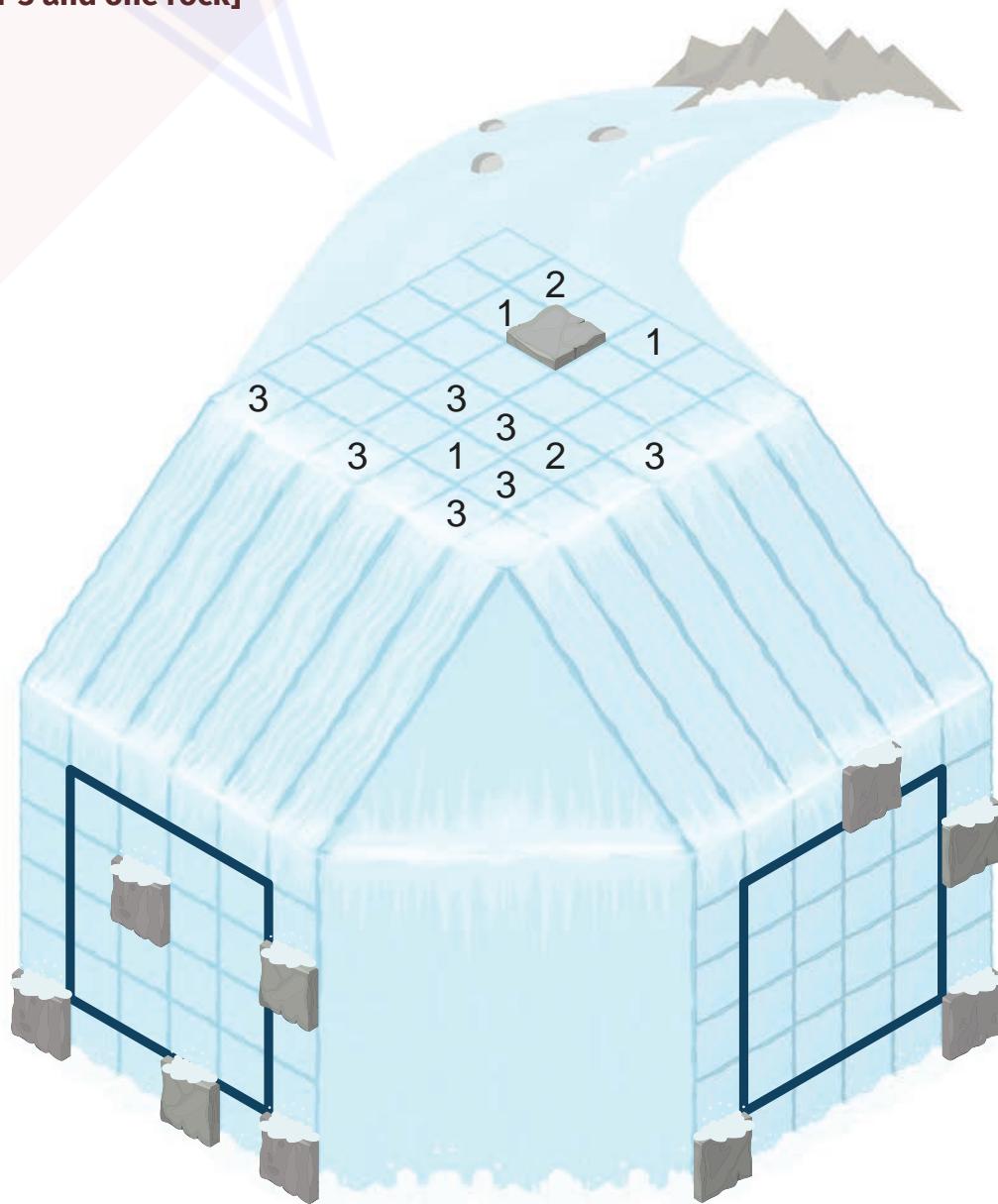
3.1 Skyscrapers (Gap) (30 + 30 Points)

Example by Serkan Yürekli (GMPuzzles.com)

A separate Skyscrapers (Gap) puzzle is formed on each side of the waterfall. The competition puzzles use the numbers 1-4 and one rock. Example puzzles use the numbers 1-3 and one rock.

Insert numbers into some cells of the grid so that each row and column of the grid contains the numbers from 1 to 4 once each and one rock. Each number in the grid represents the height of a building and each clue outside the grid indicates how many buildings can be "seen" while looking from that direction. Taller buildings block the view of smaller buildings. Some rocks may already be given and rocks do not block the view of any building.

[1-3 and one rock]
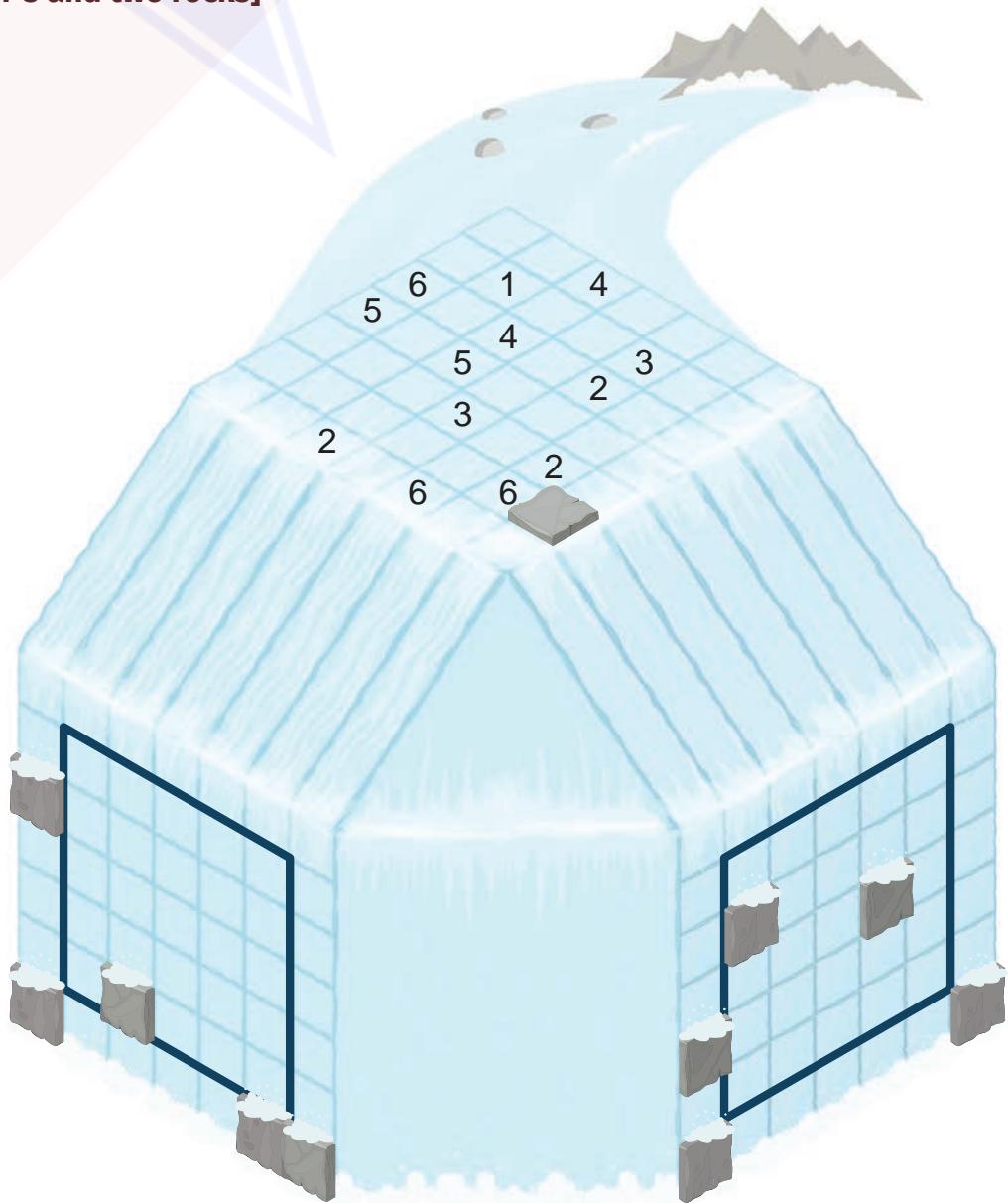
3.2 Smashed Sums (70 + 70 Points)

Example by Serkan Yürekli (GMPuzzles.com)

A separate Smashed Sums puzzle is formed on each side of the waterfall. The competition puzzles use the numbers 1-5 and two rocks. Example puzzles use the numbers 1-3 and two rocks.

Insert numbers into some cells of the grid so that each row and column of the grid contains the numbers from 1 to 5 once each and two rocks. Each clue outside the grid gives the sum of the numbers squeezed in between two rocks in that row or column. Some rocks may already be given.

[1-3 and two rocks]
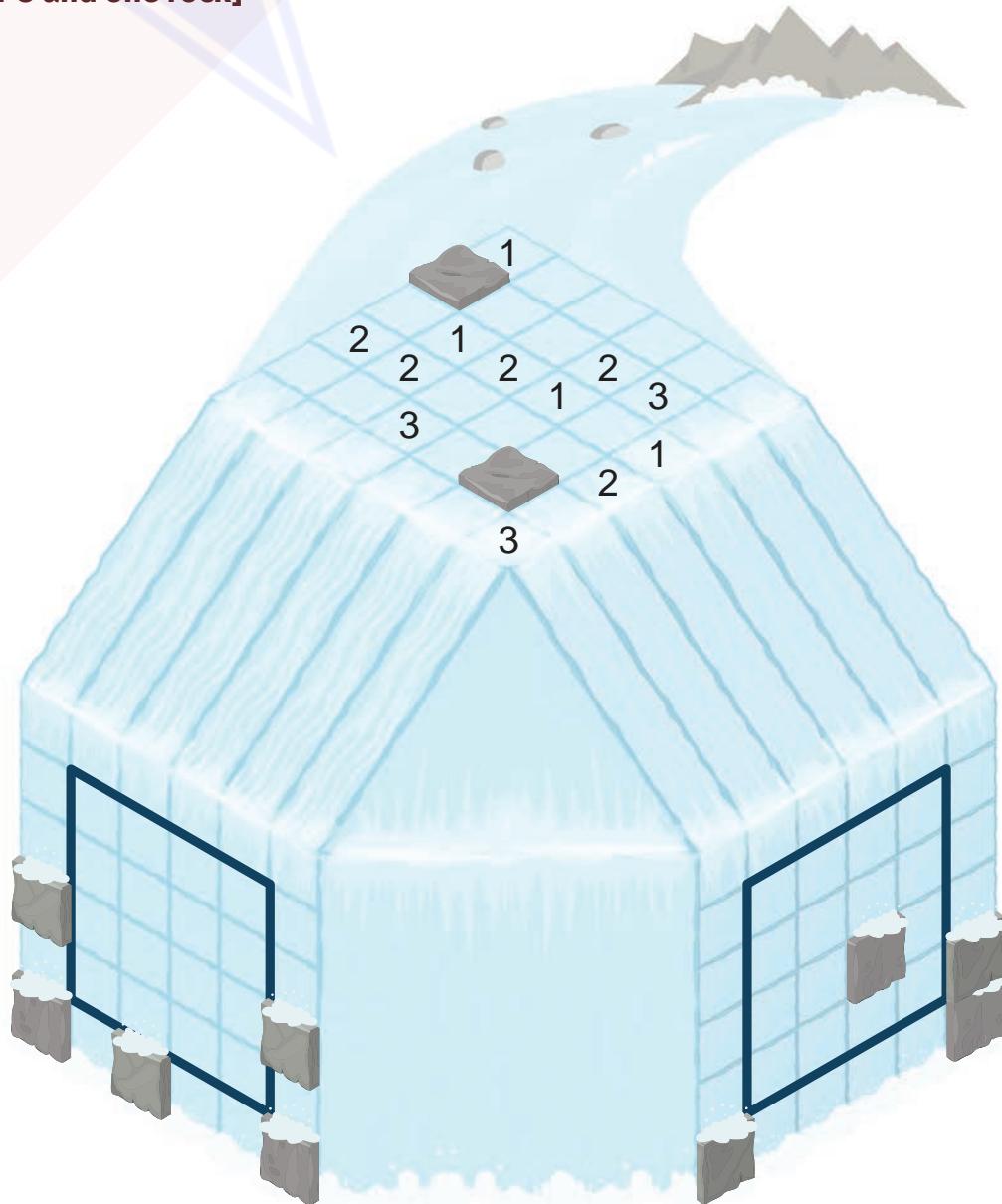
3.3 Top Heavy Number Place (First Seen) (70 + 70 Points)   Example by Serkan Yürekli (GMPuzzles.com)

A separate Top Heavy Number Place (First Seen) puzzle is formed on each side of the waterfall. The competition puzzles use the numbers 1-4 and two rocks. Example puzzles use the numbers 1-3 and one rock.

Insert numbers into some cells of the grid so that each row and column of the grid contains the numbers from 1 to 4 once each and two rocks. If a number is directly on top of another, in neighboring cells, the upper number must always be bigger. Each clue outside the grid indicates the first number seen from that direction.

[1-3 and one rock]
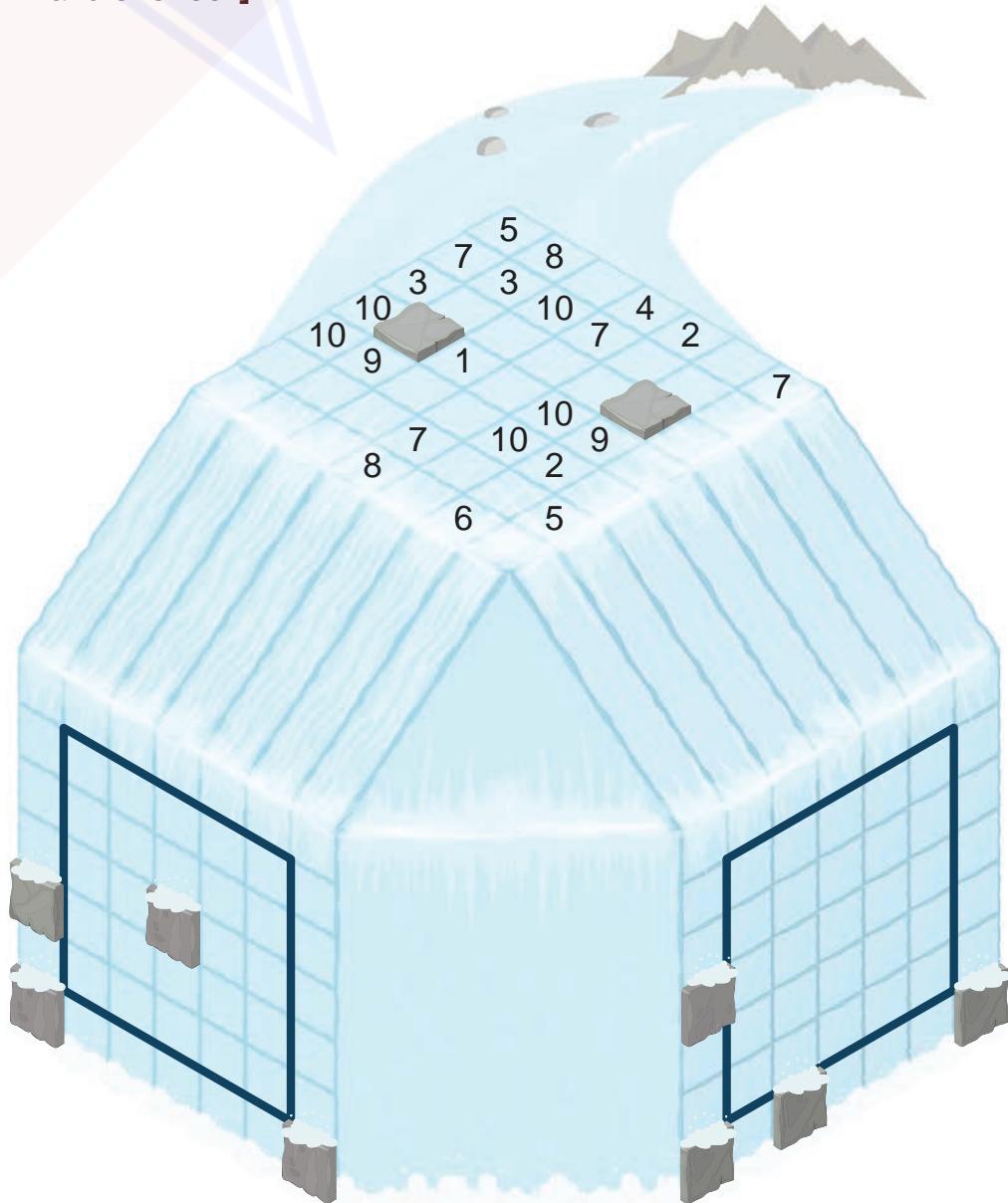
3.4 Easy as Japanese Sums (80 + 80 Points)
Example by Serkan Yürekli (GMPuzzles.com)

A separate Easy as Japanese Sums puzzle is formed on each side of the waterfall. The competition puzzles use the numbers 1-4 and two rocks. Example puzzles use the numbers 1-4 and one rock.

Insert numbers into some cells of the grid so that each row and column of the grid contains the numbers from 1 to 4 once each and two rocks. Each clue outside the grid gives the sum of the numbers in the first connected group in that direction. Some rocks may already be given.
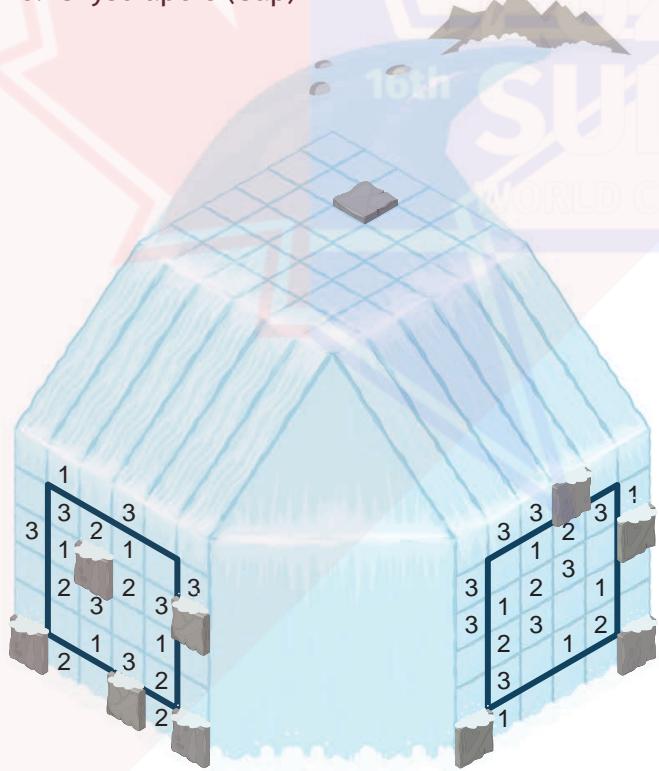
[1-4 and one rock]
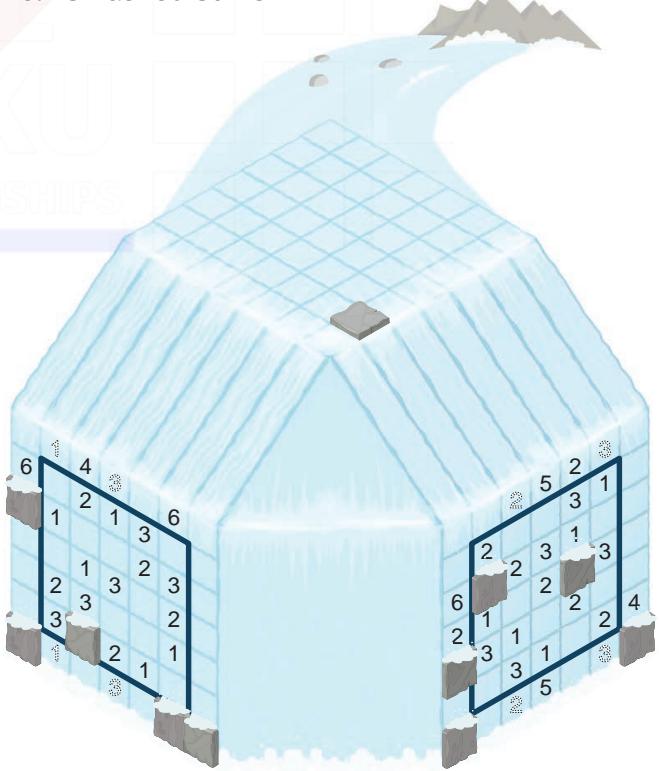
Solutions
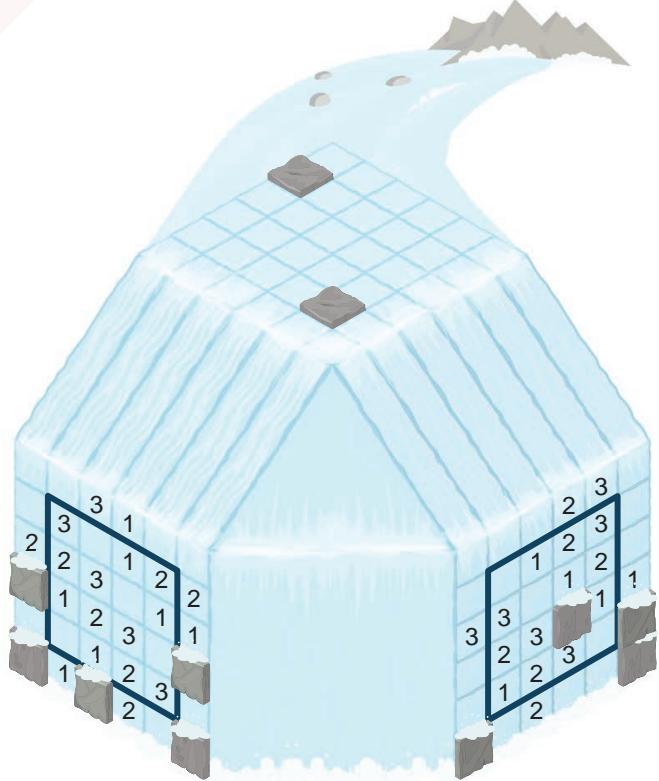
3.1 Skyscrapers (Gap)
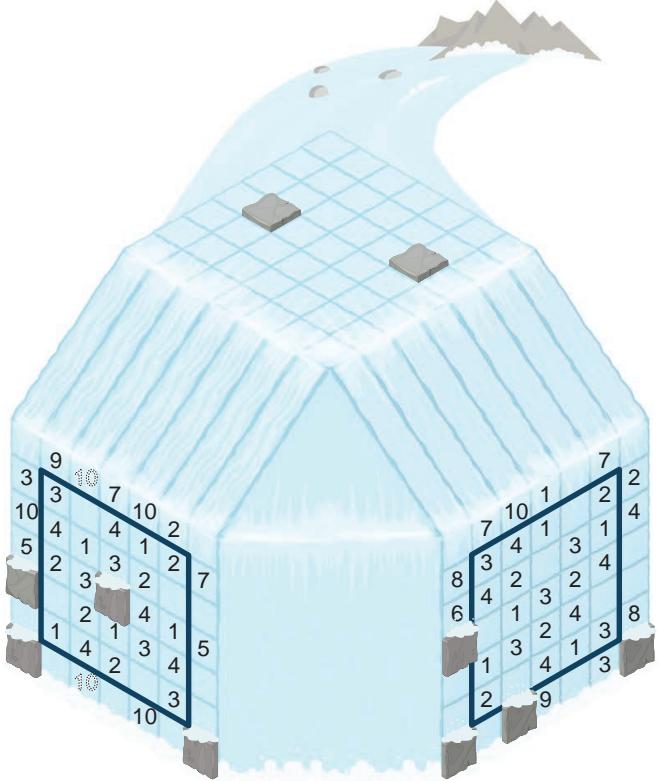
3.2 Smashed Sums
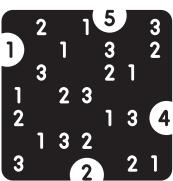
3.3 Top Heavy Number Place (First Seen)

3.4 Easy as Japanese Sums

OCTOBER 19

11:40 – 12:20

4. ROAD TO GMPUZZLES
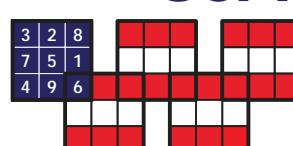
1. Math Path	15	
2. Math Path	30	
3. Math Path	50	
4. Math Path	65	
5. Math Path	110	
6. Math Path	130	
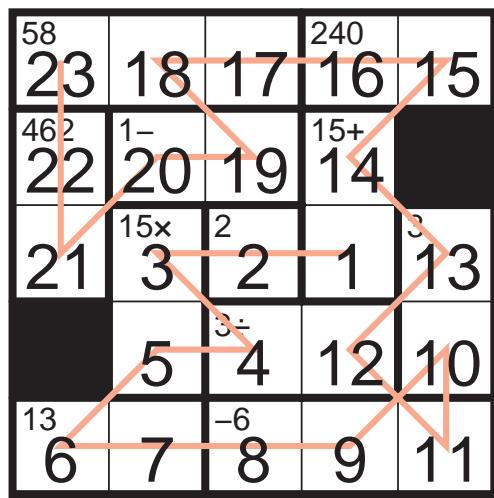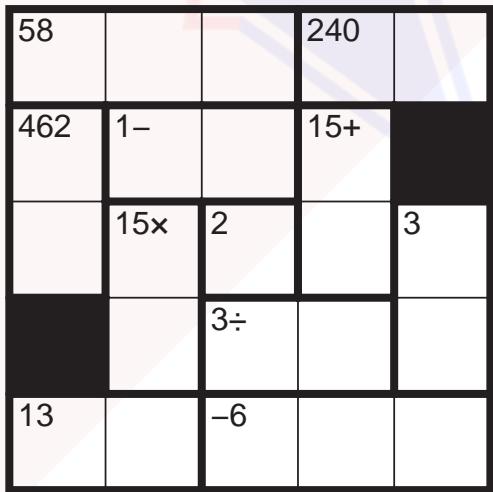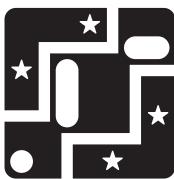
4.1-4.6 Math Path (15, 30, 50, 65, 110, 130 Points)   Example by Thomas Snyder (GMPuzzles.com)

Write a number from 1 to N (N is given for each puzzle) into each cell (except black cells) so that every number appears in the grid once. There must be a path using just adjacent cells to travel between consecutive numbers from 1 to N. Also, the number in the upper-left corner of each bold cage indicates the value of a mathematical operation (addition, subtraction, multiplication, division) applied successively to all numbers in the cage, starting with the largest number for subtraction and division (e.g. 1,2,4 with subtraction is a 1- clue as 4-2-1 = 1). The operation may or may not be given in the cage, but at least one of the four operations must apply.

{1–23}

OCTOBER 19

14:00 – 14:35

AMERICAN STARS
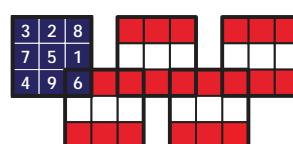
1. Star Battle	15	
2. Star Battle	25	
3. Star Battle	35	
4. Star Battle (Builder)	70	
5. Star Battle (Double)	95	
6. Star Battle	110	

GRANDMASTER PUZZLES

www.GMPUZZLES.com

TEAM **USA**
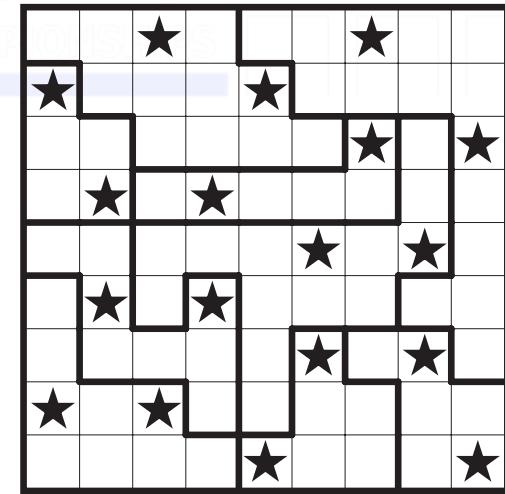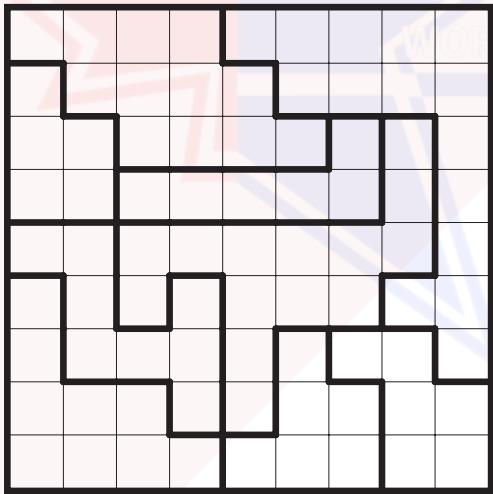
5.1, 5.2, 5.3, 5.6 Star Battle (15, 25, 35, 110 Points)

Example by Thomas Snyder (GMPuzzles.com)

Fill some cells with stars so that each row, column, and bold region contains the indicated number of stars. Stars cannot be placed in adjacent cells that share an edge or corner.

2★
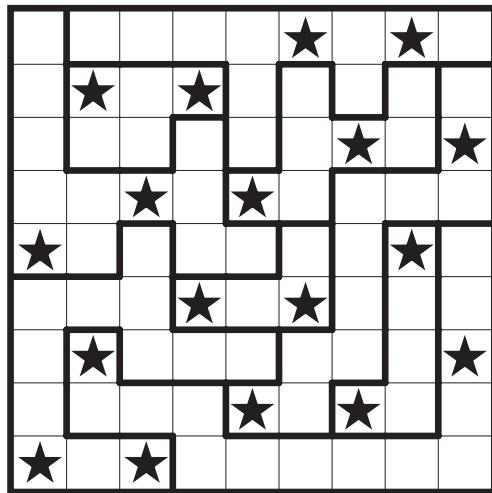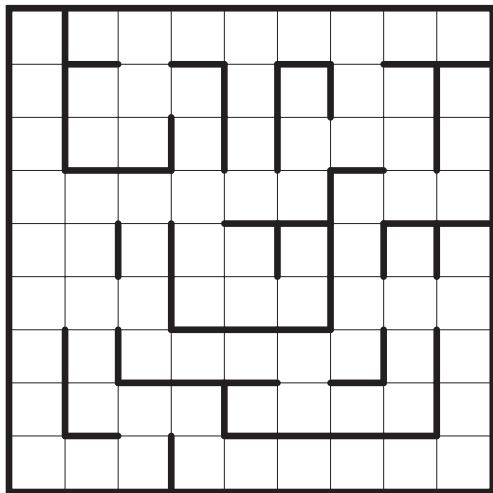
5.4 Star Battle (Builder) (70 Points)

Example by Serkan Yürekli (GMPuzzles.com)

Standard Star Battle rules. Also, some region boundaries are missing, but all given borders must separate cells in different regions.

Note: To get full points, all borders must be seen on the solution.

2★
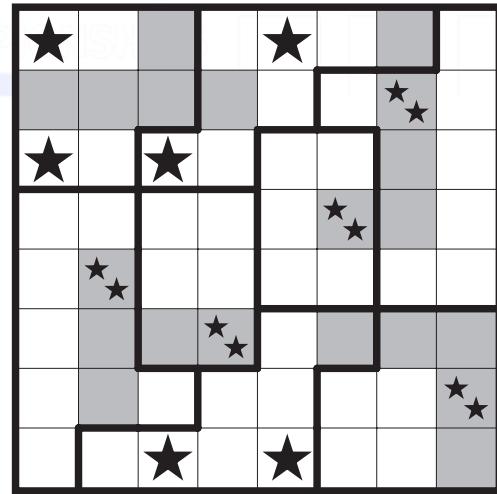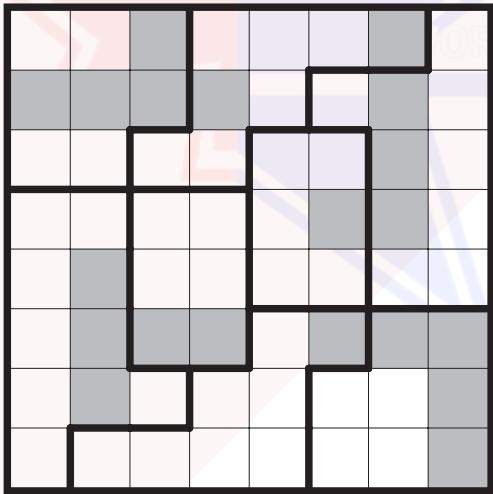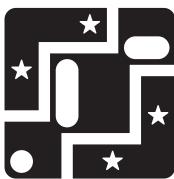
5.5 Star Battle (Double) (95 Points)

Example by Serkan Yürekli (GMPuzzles.com)

Standard Star Battle rules with three stars (two stars in the example) per row, column, and region. Also, there are some shaded cells in the grid and those cells either contain two stars or none. (In a gray cell with two stars, none of the adjacent cells sharing an edge or corner can have any stars.)

2★

OCTOBER 19

14:40 – 15:15

6. NORTH AMERICAN SIBLINGS
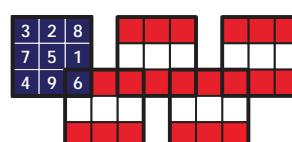
1. Battleships   60

2. Minesweeper   60

3. Parking Lot   60

4. Star Battle   60

5. Statue Park   60

6. Wittgenstein Briquet   60

Rules

Contestants are provided with a collection of 6 different Object Placement puzzles: Battleships, Minesweeper, Parking Lot, Star Battle, Statue Park and Wittgenstein Briquet.

Every puzzle contains two shapes, either colored maple leafs (in red) and/or colored stars (in blue). There are a total of 6 maple leaf shapes and 6 star shapes in all the grids. The maple leaf shapes must be matched in three pairs, and the star shapes must also be matched into three pairs. Each pair (of leaves or stars) must be exactly the same (including empty cells). Sibling shapes cannot be matched by rotating or reflecting.

Maple leaf and star shapes are places where more than one puzzle is connected. The connections are just at the level of the individual cells in terms of "containing something" or "containing nothing". As you can see in the example below, a 1×1 "star" cell in the Star Battle can be part of a 2-unit ship in the Battleships, or two different automobiles in the Parking Lot can be part of the same block in the Wittgenstein Briquet, as long as the pattern of occupied cells is preserved within the leaf/star and the extra pieces are not part of the leaf/star.

Each puzzle may have multiple solutions by itself, but there is only one solution that will complete all other grids successfully and only that specific answer will be marked correct. Contestants will be awarded the total point values of all correctly solved puzzles.

6.1 Battleships (60 Points)

Locate the indicated fleet in the grid. Each segment of a ship occupies a single cell. Ships can be rotated. Different ships cannot be placed in adjacent cells that share an edge or corner. Some ship segments, or sea cells without any ship segments, are given in the grid. The numbers on the right and bottom edges of the grid reveal the number of ship segments in that row or column.

6.2 Minesweeper (60 Points)

Place a mine into some of the empty cells so that each number represents the total count of mines in neighboring cells, including diagonally adjacent cells.

6.3 Parking Lot (60 Points)

Locate some automobiles in the grid having size 1×2 or 1×3, each containing exactly one number. Each number indicates how many unoccupied cells the automobile can move to by traveling along its longest axis, stopped only by an edge of the grid or another automobile.

6.4 Star Battle (60 Points)

Fill some cells with 1×1 squares (stars) so that each row, column, and bold region contains the indicated number of stars. Stars cannot be placed in adjacent cells that share an edge or corner.

6.5 Statue Park (60 Points)

A bank of shapes is given with the grid. Place each of the shapes exactly once into the grid, with rotations and reflections allowed. No two shapes can overlap or be orthogonally adjacent, and all of the space not occupied by shapes must be connected. Black circles in the grid represent spaces that must be contained in one of the shapes, and white circles represent spaces that may not be contained in a shape.
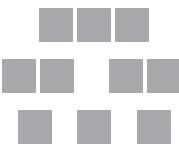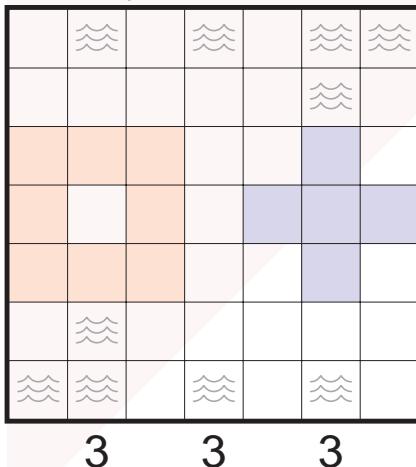
6.6 Wittgenstein Briquet (60 Points)

Locate some briquets (blocks) in the grid having size 1×3, without overlapping each other or numbers. Each number in the grid indicates the number of blocks touching that cell from the sides. All remaining cells (including numbered cells) should be connected to each other orthogonally.

Example   Example by JinHoo Ahn (GMPuzzles.com)

Battleships
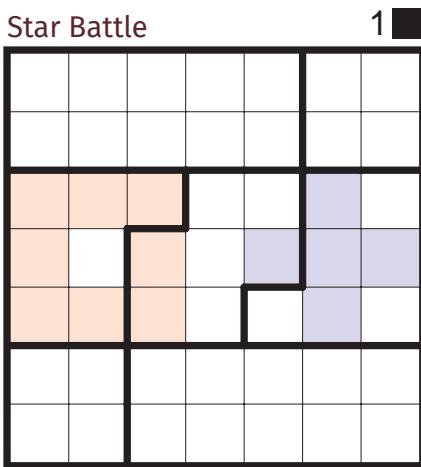
Minesweeper
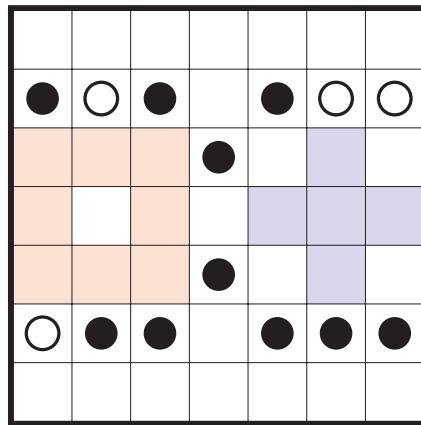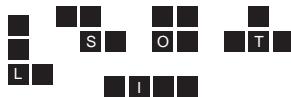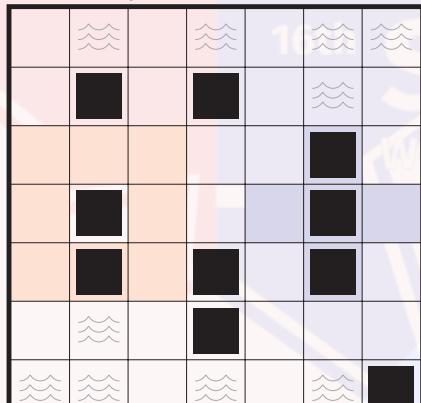
Parking Lot
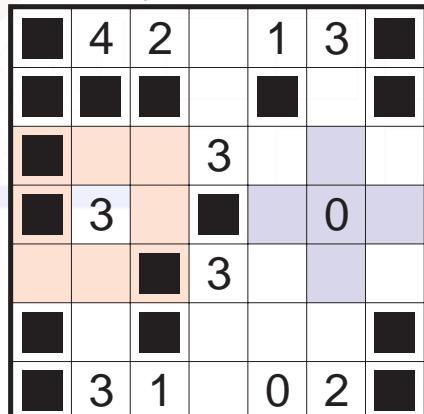
Star Battle

Statue Park

Wittgenstein Briquet
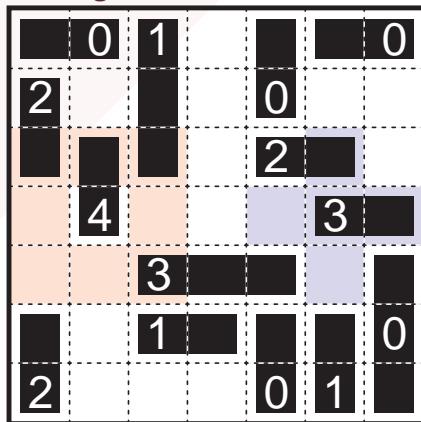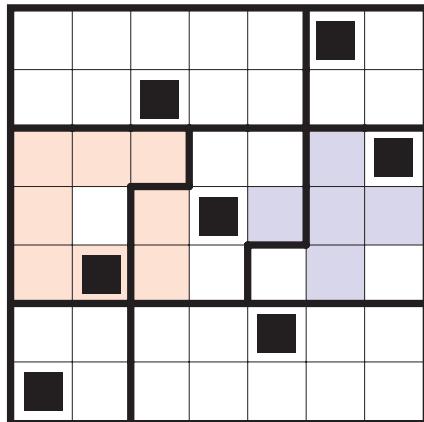
Battleships

Minesweeper
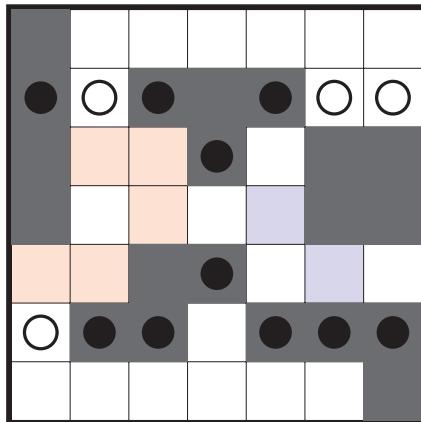
Parking Lot
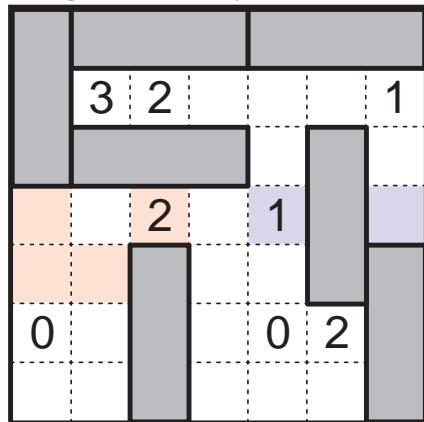
Star Battle
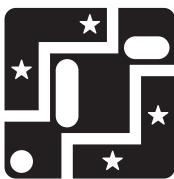
Statue Park

Wittgenstein Briquet

OCTOBER 19

15:25 - 16:15

7. A GALAXY FAR, FAR AWAY
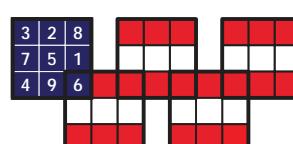
1. Akari (Myopia) — 20
2. Akari (Myopia) — 55
3. Statue Park (Myopia) — 25
4. Statue Park (Myopia) — 55
5. Battleships (Myopia) — 25
6. Battleships (Myopia) — 90
7. Wittgenstein Briquet (Myopia) — 25
8. Wittgenstein Briquet (Myopia) — 55
9. Minedoku (Myopia) — 50
10. Minedoku (Myopia) — 100
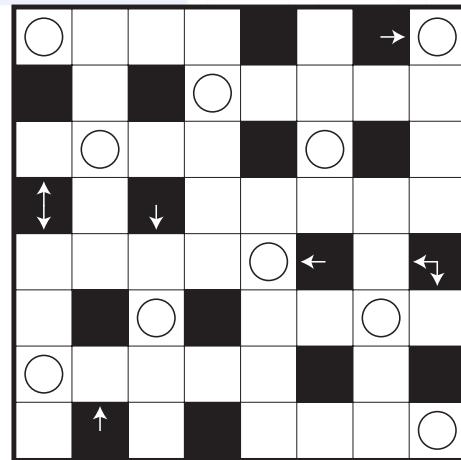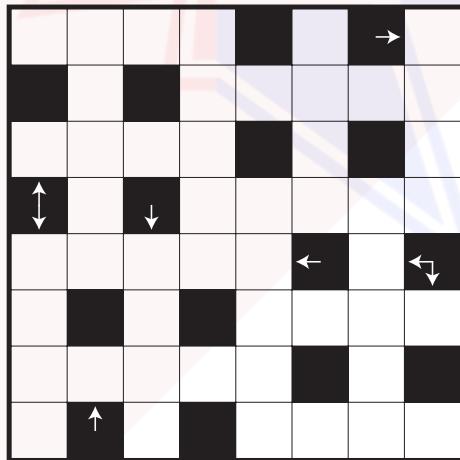
7.1, 7.2 Akari (Myopia) (20, 55 Points)

Example by David Altizio

Add a light bulb to some of the white cells so that each white cell is lit up. Each light bulb illuminates the cell it is in, as well as any horizontally and vertically adjacent cells, stopping at any black cells. No bulb can illuminate another bulb.

Also, the arrow clues indicate all the directions (up, down, left, and right) where the nearest light bulbs are located when looking from that cell. Arrow clues block the light bulbs, but do not block any other arrow clues. No light bulb can be placed in a cell with an arrow.
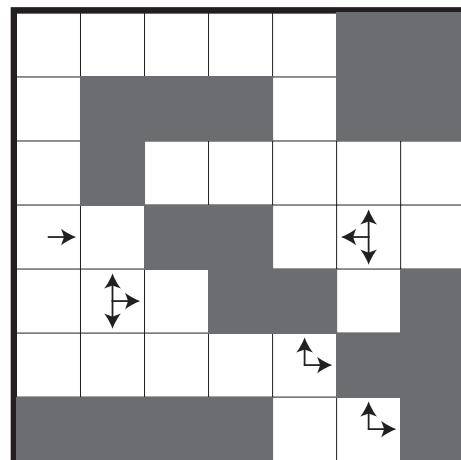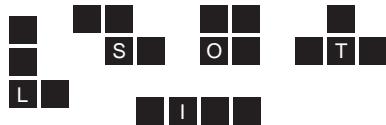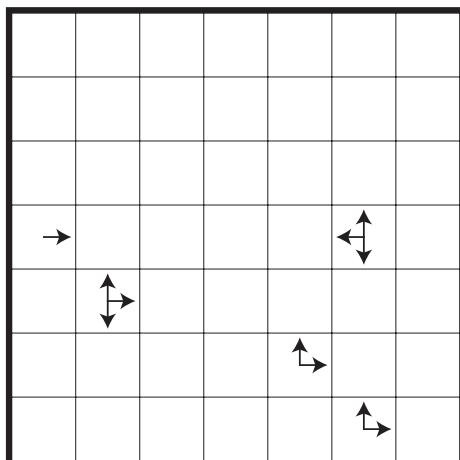
7.3, 7.4 Statue Park (Myopia) (25, 55 Points)

Example by Jamie Hargrove

A bank of shapes is given with the grid. Place each of the shapes exactly once into the grid, with rotations and reflections allowed. No two shapes can overlap or be orthogonally adjacent, and all of the space not occupied by shapes must be connected.

Also, the arrow clues indicate all the directions (up, down, left, and right) where the nearest shapes are located when looking from that cell. No shape can be placed in a cell with an arrow.
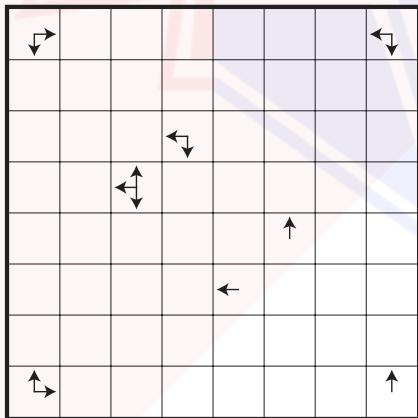
7.5, 7.6 Battleships (Myopia) (25, 90 Points)

Example by Serkan Yürekli (GMPuzzles.com)

Locate the indicated fleet in the grid. Each segment of a ship occupies a single cell. Ships can be rotated. Different ships cannot be placed in adjacent cells that share an edge or corner. The numbers on the right and bottom edges of the grid reveal the number of ship segments in that row or column.
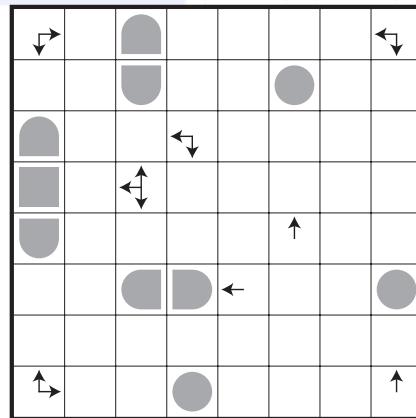
Also, the arrow clues indicate all the directions (up, down, left, and right) where the nearest ship segments are located when looking from that cell. No ship segment can be placed in a cell with an arrow.
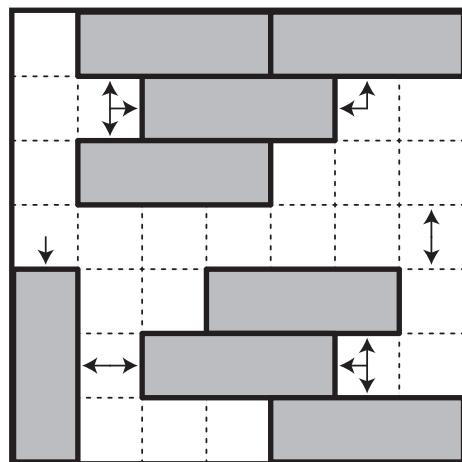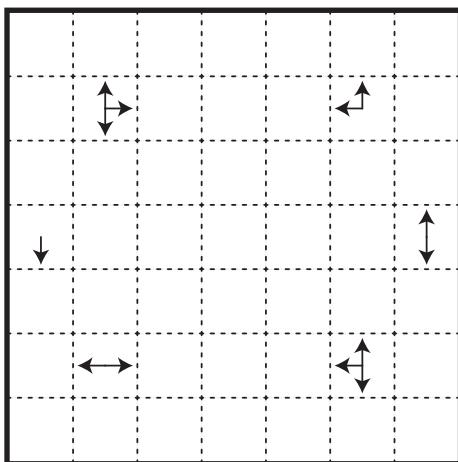
7.7, 7.8 Wittgenstein Briquet (Myopia) (25, 55 Points)

Example by Serkan Yürekli (GMPuzzles.com)

Locate some briquets in the grid having size 1×3. No two briquets can overlap, and all of the space (including arrow clue cells) not occupied by briquets must be connected.

Also, the arrow clues indicate all the directions (up, down, left, and right) where the nearest briquets are located when looking from that cell. No briquet can be placed in a cell with an arrow.
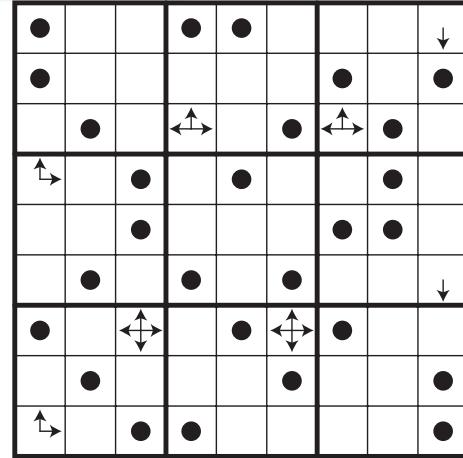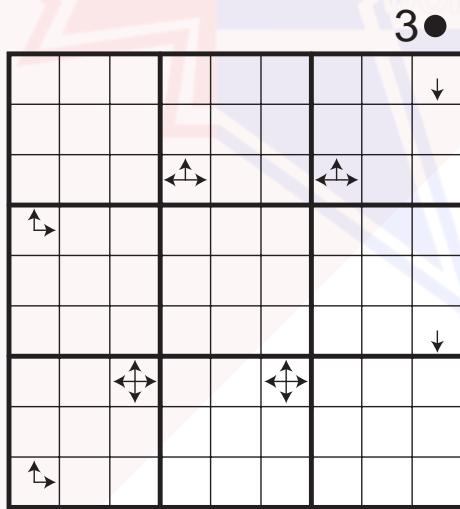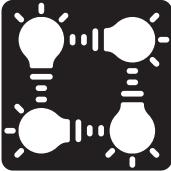
7.9, 7.10 Minedoku (Myopia) (50, 100 Points)

Example by JinHoo Ahn (GMPuzzles.com)

Place a mine into some of the empty cells so that each row, column, and bold region contains exactly indicated number of mines.

Also, the arrow clues indicate all the directions (up, down, left, and right) where the nearest mines are located when looking from that cell. No mine can be placed in a cell with an arrow.

OCTOBER 19

16:35 - 17:20**
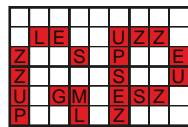
8. AHA MOMENTS

First Half - 1. Aha Moments	225	
First Half - 2. Aha Moments	225	
Second Half - 3. Aha Moments	225	
Second Half - 4. Aha Moments	225	
Team - 5. Aha Moments	900	

TOTAL
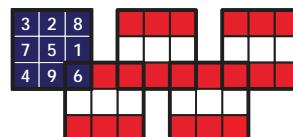
**approximate times; team rounds will be allowed to run until at least 2 teams are finished.
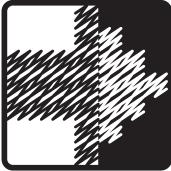
Rules

225 points for each individual Aha puzzle (900 total) and 900 points for the final Aha puzzle.

Each team is divided into two halves with two members each. Each half will receive two puzzles to solve together. Communication in any form (verbal, hand signals, etc.) with the other half of the team is prohibited in this stage. Once the judges confirm the first stage is completed successfully, team halves will move on to the final stage to solve a single puzzle which combines mechanics from all the puzzles from the first stage. It is not needed for all members of the team to be in the final stage to complete the round successfully.

Team members may freely choose to abandon the first stage and move ahead to the final stage at any time. Team members can make the decision individually to go to the final stage leaving their partner at the first stage. However, once the first stage is abandoned, there is no going back to the first stage.

Every puzzle type in this round is presented without any written instructions. For each type—including the final one—an example puzzle is provided. The 'only correct solution' is provided, clearly identified with a check mark. Some incorrect solutions may also be provided, clearly identified with a cross mark.

OCTOBER 19

17:30 - 18:15

---

9. RED AND BLUE
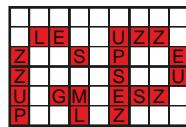
1. Neon Knetwork   1800
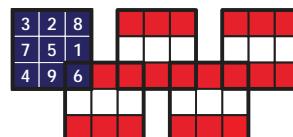
**approximate times; team rounds will be allowed to run until at least 2 teams are finished.
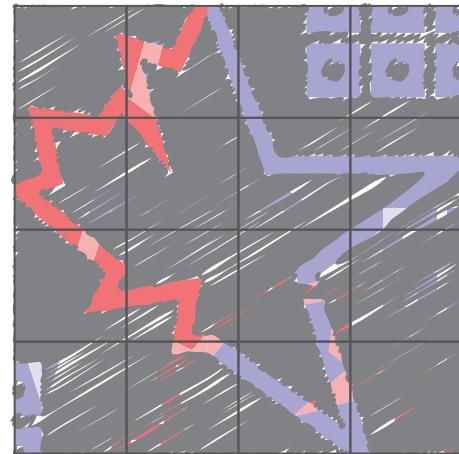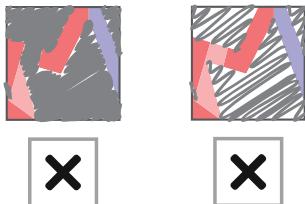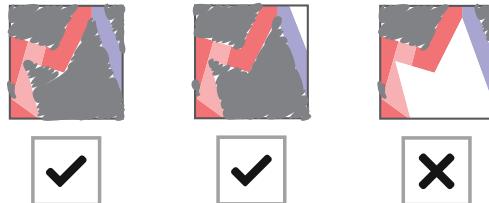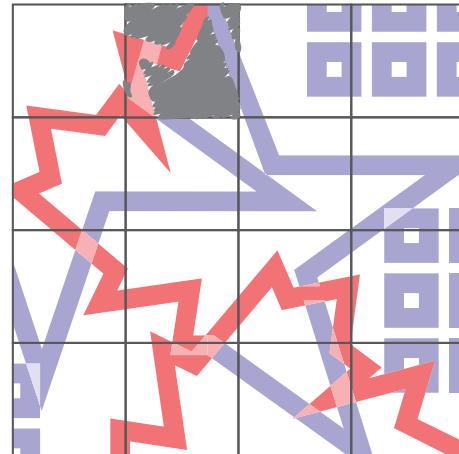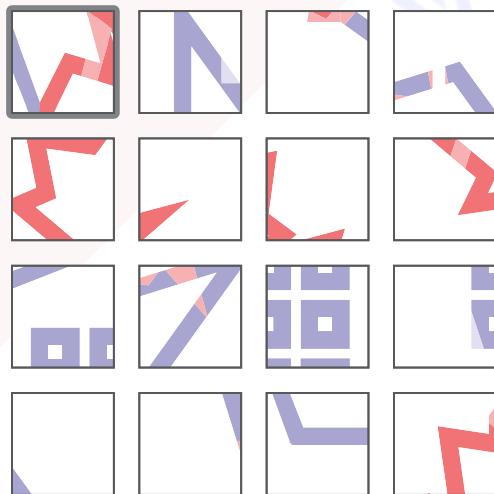
9.1 Neon Knetwork (450/900/1800 Points)   Example by Cihan Altay

For each given tile in the inventory, find the location of the exact design of that tile within a square piece on the grid, and scribble out the remaining bits inside that piece. The design must be a perfect match in size and color. It may appear rotated, but it is not turned over. One sample tile has already been located. When all tiles are completed, a coherent image will appear.

Small errors that would not interfere with the design are permissible if this is rare on the grid. Larger omissions, clear mistakes, and inadequate shading result in penalties. Teams are eligible for full marks and bonus if there are at most two incorrect pieces in their solution (60%).

Partial credit is only given by how much a team completes the borders successively, advancing towards the center. Completing all the squares along the border is worth 25% of the score (maximum of one error). Completing all the squares along the border twice over (i.e., two squares deep) is worth 50% of the score (maximum of one error). There is no other partial credit.

OCTOBER 20

09:00 - 09:50

10. WORDS CAN DEFINE US
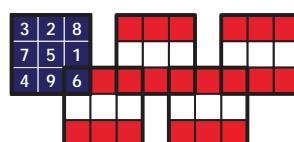
1. Wordle Bank	10	
2. Wordle Bank	105	
3. One or Two	60	
4. Star-Crossed	85	
5. Crisscross Crash	60	
6. Piece Arch	80	
7. Crisscross	100	

10.1, 10.2 Wordle Bank (10, 105 Points)

Example by David Altizio

A Wordle game challenges the player to discover what the answer word is, by making successive guesses, of an unknown word. After each guess, a row of tiles gives information about how accurate the guess was: a green tile indicates the letter is in the answer and in the correct spot; a yellow tile indicates the letter is in the answer but in the wrong spot; a gray tile indicates the letter is not in the answer in any spot.

One or more Wordle games have been played and information about the first few guesses of each game is given. All guesses are also given collectively, in alphabetical order. Match each guess to its row.

Guesses or answer words do not contain repeated letters. The answers to the Wordle games need not be valid English words. It is not your task to find the answer for each game, just to identify the order of all the guesses from the given information.

ACT	BED	BYE	CUB	PIT	SAD
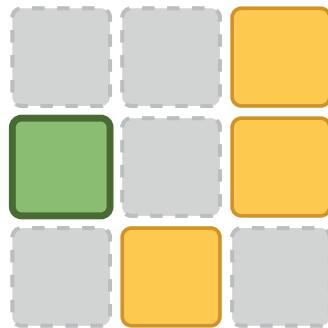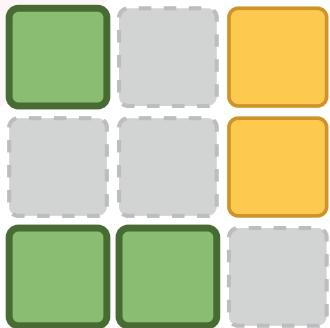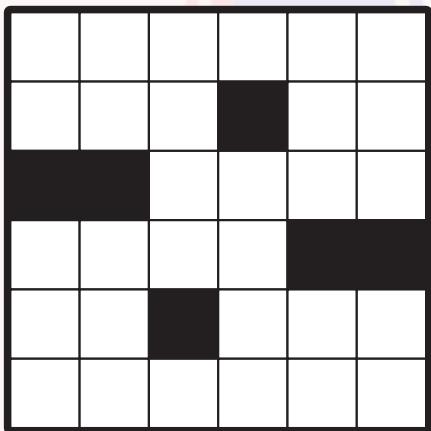
10.3 One or Two (60 Points)

Example by Cihan Altay

Enter either one or two letters into each cell so that all the listed words read across or down. When two letters are in a single cell, the order used is the same in both directions. Every cell in the grid is used by two words.

AD	IS	MO	NE	ATE	HAT	LEO	ZEE
CATS	CHAR	HYPE	ODES	RESET	RHYME	SEIZE	SPENT
LESSER	ELEMENT	REMORSE	LEARNERS				
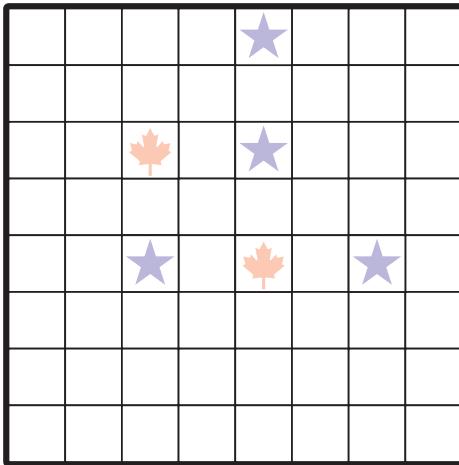
10.4 Star-Crossed (85 Points)

Example by Cihan Altay

Enter all of the capitalized last names (ignoring spaces and punctuation) of the given TV and movie stars (from the U.S. and Canada) into the grid crisscross style: words appear either across or down, and all words formed by consecutive letters in the grid must be in the word list. Every cell in which two names cross is marked with a star or a leaf. A star indicates the crossed letter is strictly one of A, E, I, O, U, or Y. A leaf indicates one of the remaining letters of the alphabet.

Jodie FOSTER

Jennifer HUDSON

Ryan O'NEAL

Sarah POLLEY

Martin SHORT

Kathleen YORK
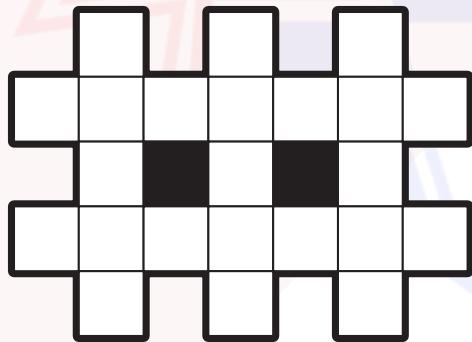
10.5 Crisscross Crash (60 Points)

Serkan Yürekli (GMPuzzles.com)

Enter all of the given words into the crisscross grid, across or down, one letter per cell. Some rows and columns may contain two or more words. In such cases, each word must overlap the next by exactly one letter. Every cell in the completed grid will contain a letter.

EP	RO	MASS	PAST
SKIN	CANAL	CRAIG	KASPER
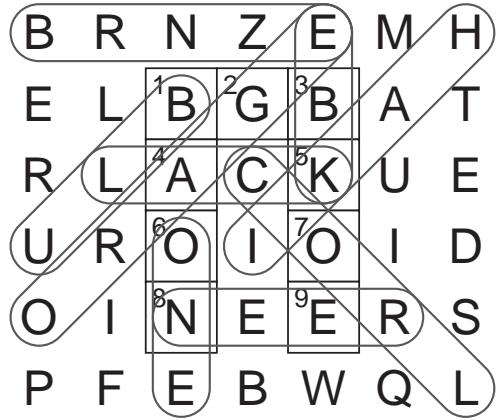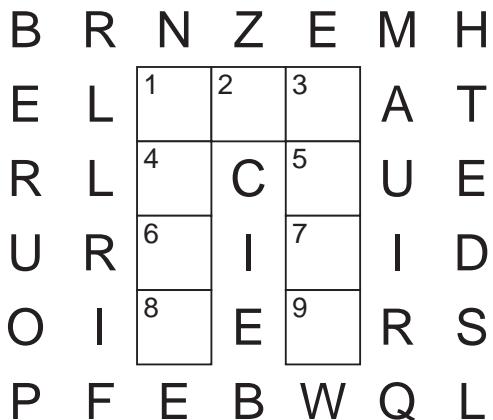
10.6 Piece Arch (80 Points)

Example by Cihan Altay

Locate all the numbered words in the word search, except that one letter will be missing from each word. For each word, place its missing letter into the correspondingly numbered cell in the grid. All such letters added to the grid can be used when searching for the words, including the word from which the letter was removed. Words may read horizontally, vertically, diagonally; either forward or backward.
For example, if word #2 is PEACE, the missing letter might be E, which would go into cell #2, and then either PEAC or PACE must be located somewhere in the grid.

1. BONE	4. CORAL	7. KOBE
2. GREEN	5. KHAKI	8. ORANGE
3. BLACK	6. BRONZE	9. BLUE

10.7 Crisscross (100 Points)

Example by Cihan Altay
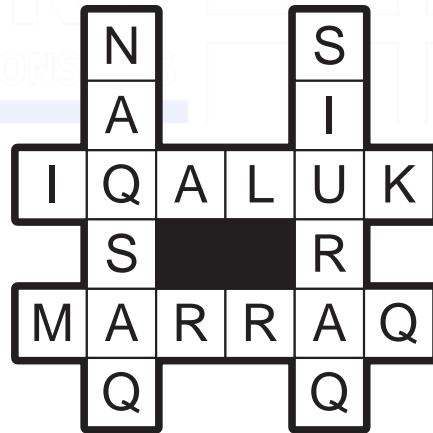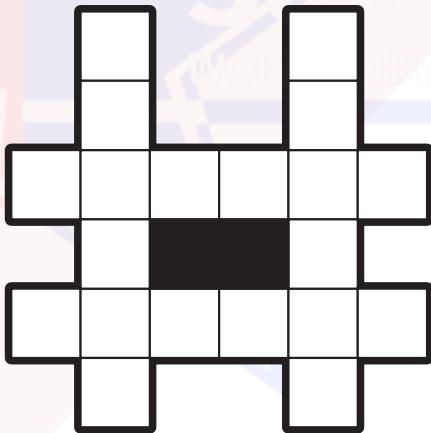
Enter all of the given words into the crisscross grid, across or down, one letter per cell.

IQALUK ᐃᖃᓗᒃ
fish

MARRAQ ᒪᕐᕋᖅ
mud

NAQSAQ ᓇᖅᓴᖅ
valley

SIURAQ ᓯᐅᕋᖅ
sand

11. WHAT IS THE MEANING OF AQRE?
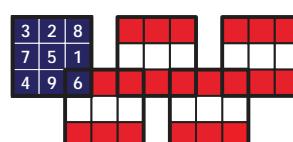
1. Aqre	15
2. Aqre	30
3. Aqre	60
4. Aqre	65
5. Aqre	100
6. Aqre (Symmetry)	130
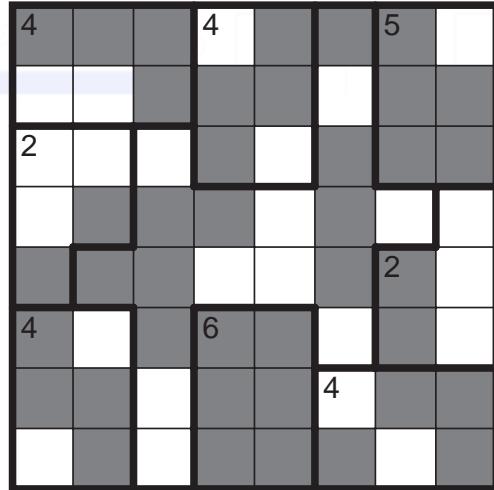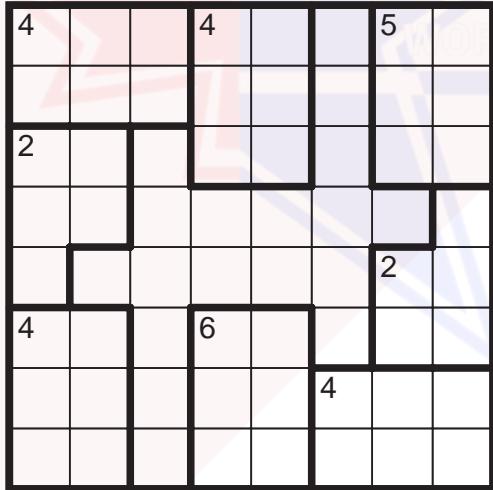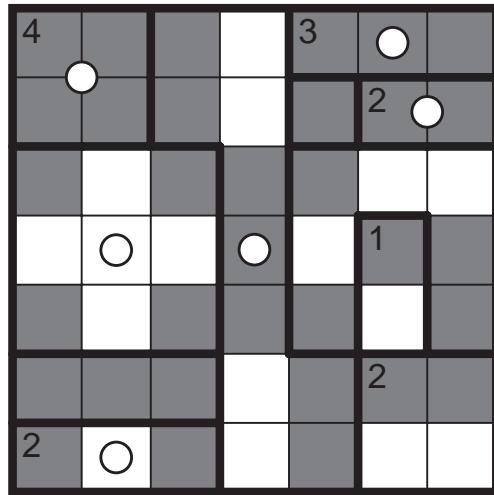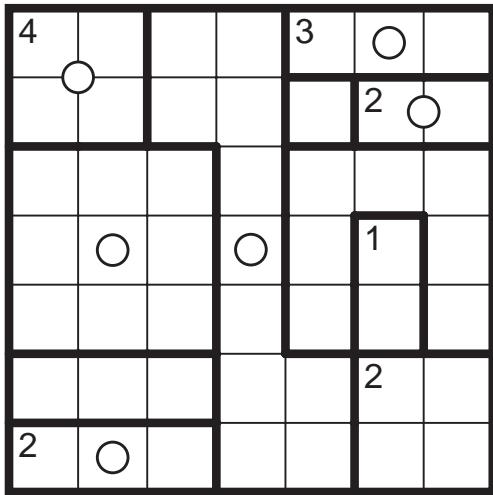
11.1-11.5 Aqre (15, 30, 60, 65, 100 Points)

Example by Serkan Yürekli (GMPuzzles.com)

Shade some cells so that all shaded cells form one connected group. Regions with numbers must contain the indicated count of shaded cells, and it is allowed to shade over the numbered cells. There may not exist a run of four or more consecutive shaded or unshaded cells horizontally or vertically anywhere in the grid.

11.6 Aqre (Symmetry) (130 Points)

Example by Serkan Yürekli (GMPuzzles.com)

Standard Aqre rules. Also, some regions have a circle in their center. In these regions, the shaded cells must have 180° rotational symmetry around the circle of the region. There is no restriction on regions without a circle.
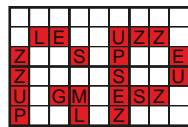
OCTOBER 20

10:50 – 12:05

12. STRETCHING OUR LEGS
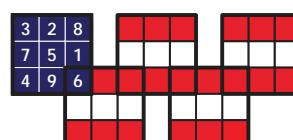
|	
1. Canal View	55
2. Tapa	55
3. Nanro (Signpost)	80
4. LITS	90
5. Cross the Streams	100
6. Choco Banana	110
7. Heyawake	130
8. Nurikabe	130
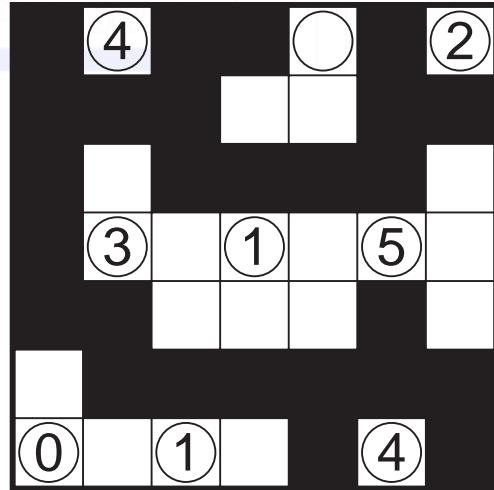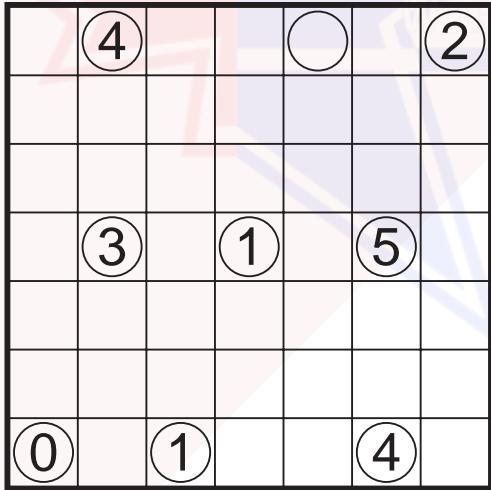
12.1 Canal View (55 Points)

Example by Serkan Yürekli (GMPuzzles.com)
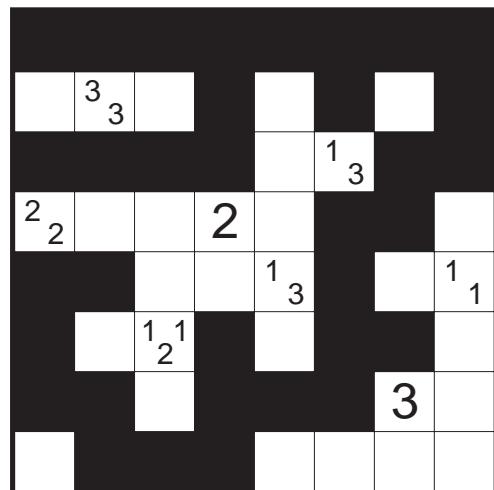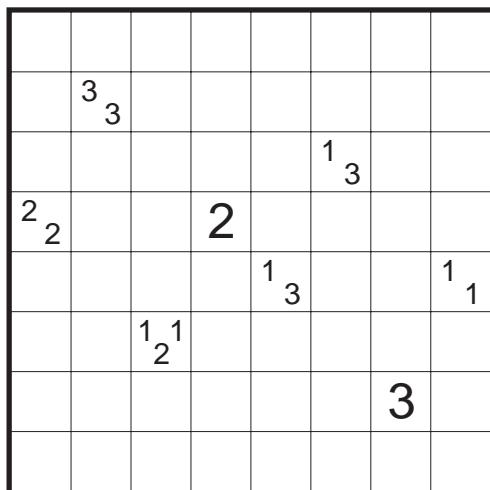
Shade some empty cells black to create a single connected group. Cells with circles cannot be shaded, and the shaded cells cannot form a 2×2 square anywhere in the grid. Each numbered cell indicates the total count of shaded cells connected vertically and horizontally to that numbered cell.

12.2 Tapa (55 Points)

Example by Serkan Yürekli (GMPuzzles.com)
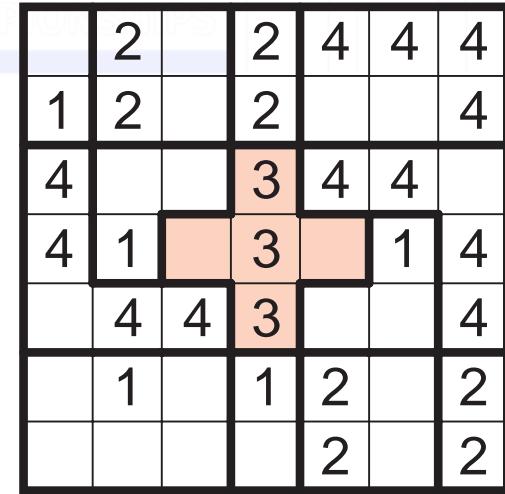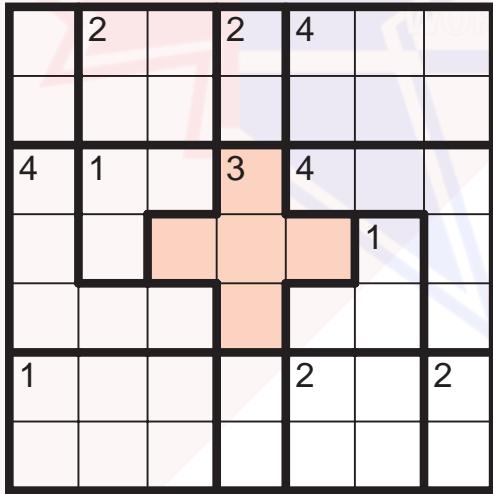
Shade some empty cells black to create a single connected wall. Numbers in a cell indicate the length of consecutive shaded blocks in the neighboring cells. If there is more than one number in a cell, then there must be at least one white (unshaded) cell between the black cell groups. Cells with numbers cannot be shaded, and the shaded cells cannot form a 2×2 square anywhere in the grid.

12.3 Nanro (Signpost) (80 Points)

Example by Serkan Yürekli (GMPuzzles.com)
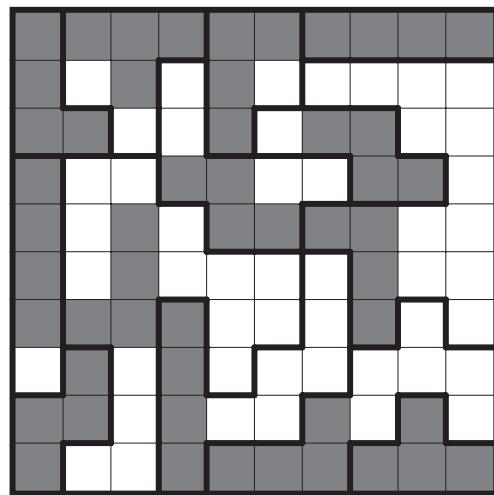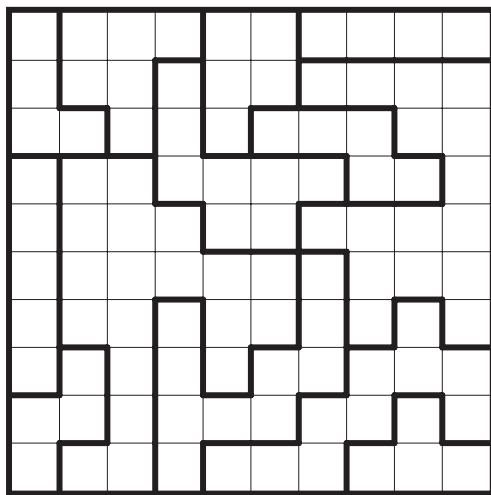
Label some cells with numbers to form a single connected group of labeled cells. No 2×2 group of cells may be fully labeled. Each label number must be equal to the total count of labeled cells in that bold region, and all bold regions contain at least one labeled cell. The given numbers indicate how many cells are labeled in that region (but not necessarily which cells are labeled). When two label numbers are orthogonally adjacent across a region boundary, the numbers must be different.

12.4 LITS (90 Points)

Example by Thomas Snyder (GMPuzzles.com)
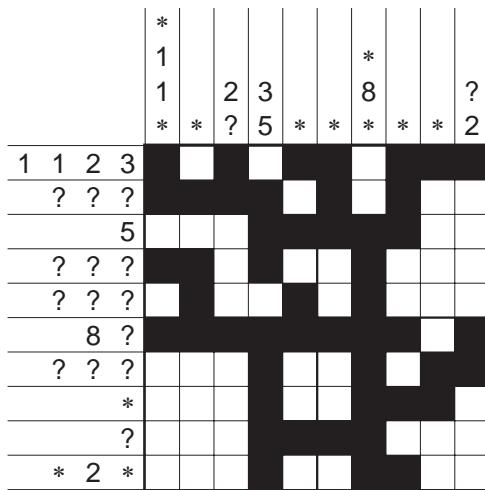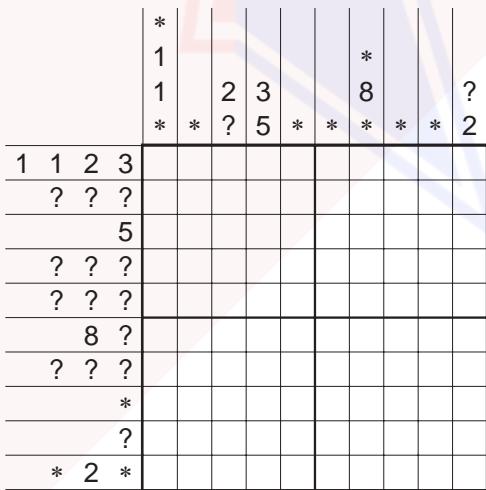
Shade exactly four connected cells in each outlined region, to form an L, I, T, or S tetromino, so that the following conditions are true: (1) All shaded cells are connected with each other; (2) No 2×2 group of cells can be entirely shaded black; (3) When two tetrominoes in adjacent regions share an edge, they must not be of the same type (L, I, T, or S), regardless of rotations or reflections.

12.5 Cross the Streams (100 Points)

Example by Grant Fikes (GMPuzzles.com)
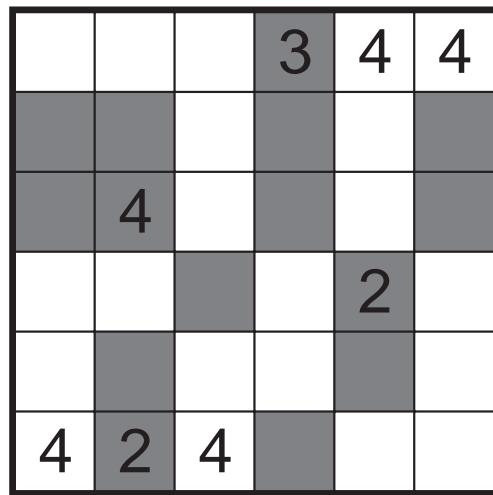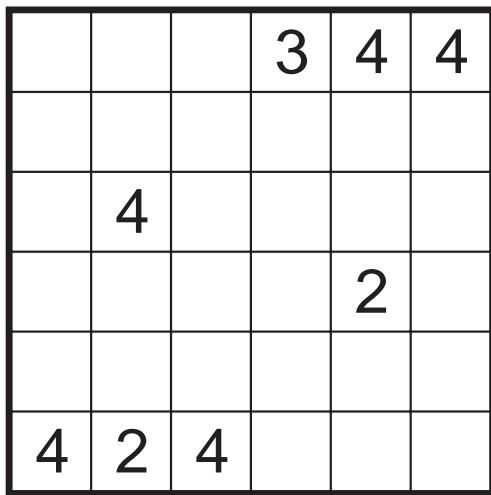
Shade some empty cells black to create a single group of black cells that are all connected to each other through their edges. No 2×2 cell area within the grid contains all black cells. Numbers to the left/top of the grid represent the groups of consecutive black cells which are in that row/column in order, either from left to right or from top to bottom. For example, a clue of "3" means the row or column has three consecutive black cells, and a clue of "3 1" means that the row or column has a group of three consecutive black cells followed by a single black cell, separated by at least one white cell. A question mark (?) represents a group of consecutive black cells whose size is unknown; an asterisk (*) represents any number of unknown groups of black cells, including none at all. (The bold lines dividing some grids into 5×5 blocks are to help with counting.)

12.6 Choco Banana (110 Points)

Example by David Altizio
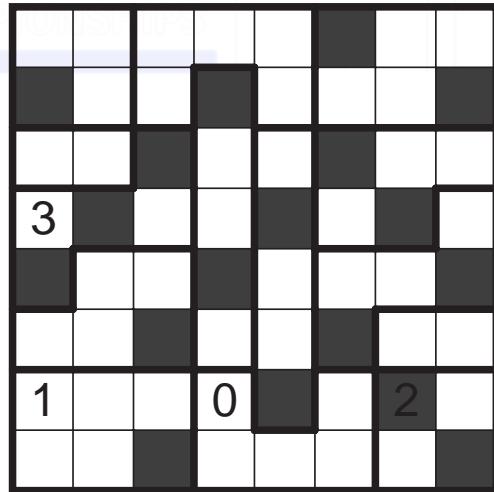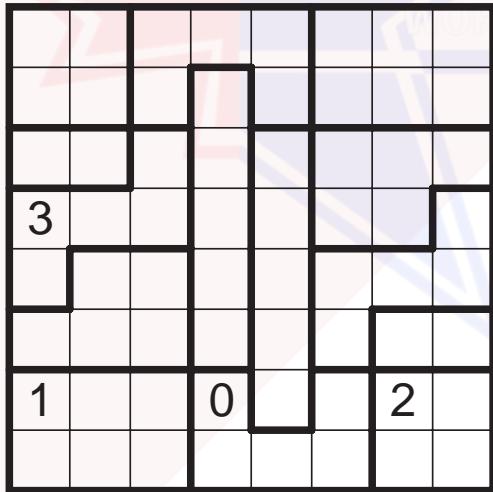
Shade some cells so that each group of adjacent shaded cells must be rectangles. Any unshaded group cannot be rectangles. Each number represents the size of the shaded or unshaded group it is in. Any shaded or unshaded group may contain zero, one, or more of the given numbers.

12.7 Heyawake (130 Points)

Example by Serkan Yürekli (GMPuzzles.com)
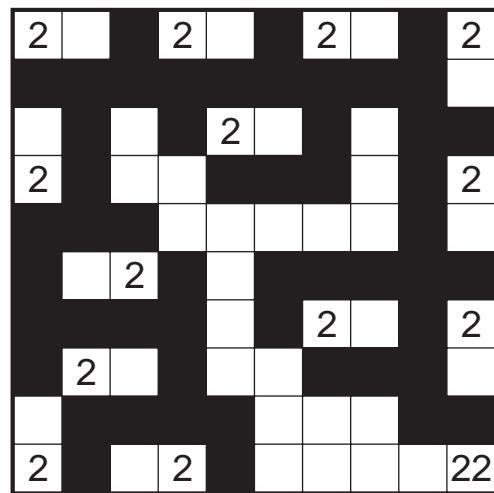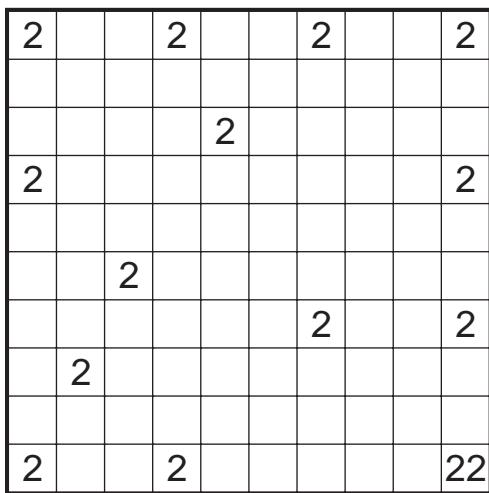
Shade some cells black so that all remaining white cells are connected as part of a single connected group; shaded cells cannot share an edge. No unbroken sequence of white cells in any row or column can cross two thick boundaries. A number in a region indicates the number of shaded cells in that region. Regions with no number may have any number of shaded cells. Cells with numbers can be shaded over.
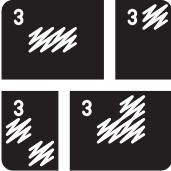

12.8 Nurikabe (130 Points)

Example by Thomas Snyder (GMPuzzles.com)

Shade some empty cells black so that the grid is divided into white areas, each containing exactly one number and with the same area in cells as that number. Two white areas may only touch diagonally. All black cells must be connected with each other, but no 2×2 group of cells can be entirely shaded black.
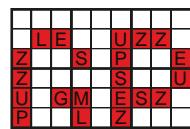
**OCTOBER 20**

13:45 - 14:50

13. ISLANDS OF INSIGHT
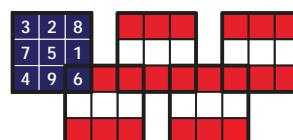
1. Islands of Insight — 40
2. Islands of Insight — 45
3. Islands of Insight — 60
4. Islands of Insight — 60
5. Islands of Insight — 90
6. Islands of Insight — 70
7. Islands of Insight — 110
8. Islands of Insight — 85
9. Islands of Insight — 140

Rules

This round consists of 9 Islands of Insight puzzles. Each is a shading puzzle consisting of:
• A rectangular grid
• A set of symbols placed in some of the cells of the grid
• A set of constraints placed above the grid

The goal of each puzzle is to shade some of the cells in the grid such that all **symbol rules** and all included **constraint rules** are satisfied. The rules are listed below.

There are four types of **symbols** that may be included in the grids:
1) **Numbers:** Cells containing numbers must always remain unshaded. Numbers indicate the total number of unshaded cells that can be seen in a straight line vertically and horizontally from the numbered cell, including the cell itself.

<p align="center">⑤   ⑯</p>

2) **Letters:** Cells containing letters must always remain unshaded. If two or more letters are the same, they must lie in the same unshaded region. If two letters are different, they must lie in different unshaded regions.

<p align="center">Ⓐ   Ⓓ</p>

3) **Black and White Circles:** Black circles indicate shaded cells; white circles indicate unshaded cells.

<p align="center">◯   ●</p>

4) **Mirror Symmetry Symbols:** Cells containing these symbols must remain unshaded. There are four kinds of mirror symmetry symbols: horizontal, vertical, and both diagonals. An unshaded region containing a symmetry symbol must be mirror-symmetric, with the axis of symmetry passing through the symbol and matching its orientation. Only the shape of the region needs to be symmetric (the positions of symbols such as numbers and letters are ignored when determining symmetry). If a region contains multiple symmetry symbols, it must exhibit a symmetry for each of them.

<p align="center">◀   ◓   ♠   ◢</p>

There are four types of **constraints** that may be included above the grids:

1) **All shaded cells are connected.** In puzzles where this constraint is included, all shaded cells in the grid must be orthogonally connected.

2) **All unshaded cells are connected.** In puzzles where this constraint is included, all unshaded cells in the grid must be orthogonally connected.

3) **All shaded regions have area N.** In puzzles where this constraint is included, all shaded regions must consist of exactly N orthogonally connected cells. N may be any positive integer and may be different in different puzzles.

4) **Don't make this pattern.** This constraint will be accompanied by a small grid illustrating a forbidden pattern. Forbidden patterns consist of white circles (indicating unshaded cells), black circles (indicating shaded cells), and empty cells (indicating "don't cares"). Forbidden patterns may not occur in the solution to the puzzle. For example, a 2×2 region of shaded cells being forbidden is similar to Tapa or Nurikabe. Reflections and rotations of forbidden patterns are also forbidden.

Rules

Additional clarifications and tips:
• All cells of the grid must be either shaded or unshaded.
• Each cell of the grid will contain at most one symbol.
• Regions in the solution may contain any number of symbols, including symbols of different types, or no symbols at all.
• Not all symbols are given. In particular, there may be symmetrical regions without symmetry symbols in the solution.
• Puzzles may be accompanied by any number of constraints, including none at all.
• Puzzles may be accompanied by multiple **Don't make this pattern** constraints. In that case, all forbidden patterns must be avoided in the solution.
• A puzzle can contain any mixture of symbols and constraints. They could be combined to create familiar genres (such as yin-yang or kuromasu) or entirely novel combinations.
• Symbols are ignored when checking for forbidden patterns. Only the shaded or unshaded status of a cell is considered.

*The puzzles in this round have been provided by **Lunarch Studios.** Their upcoming video game **Islands of Insight** (developed in partnership with **Behaviour Interactive**) serves as the inspiration for the puzzles in this round, as the game contains logic puzzles that make use of similar mechanics. No information about the game is required to solve these puzzles.*

Example 1

Example by Jamie Hargrove
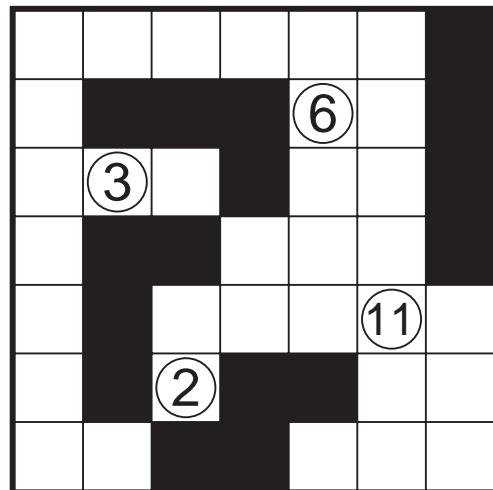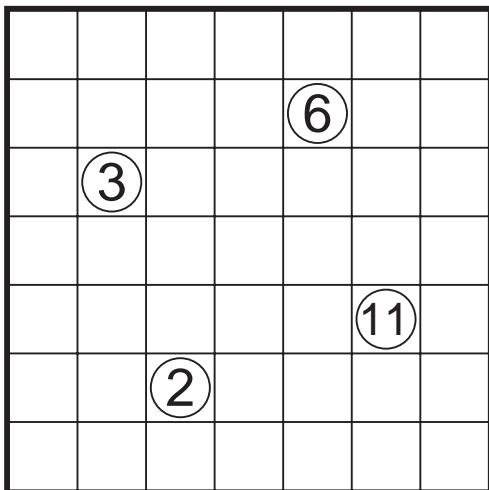
Constraints:
• All unshaded cells are connected.


• All shaded regions have area 4.
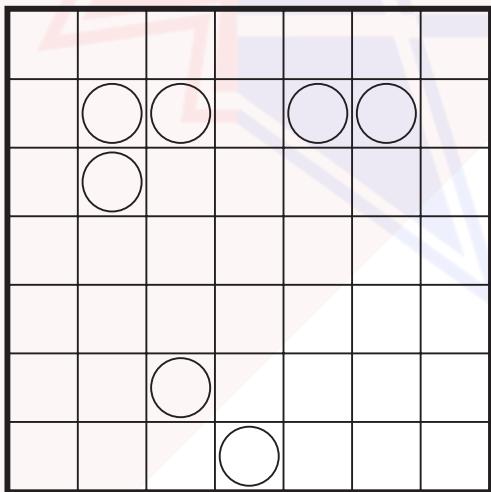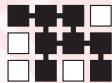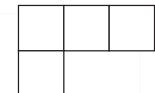
Example 2

Example by Jamie Hargrove
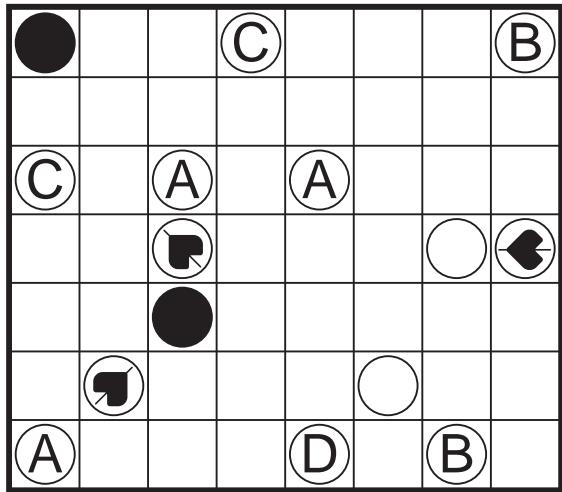
Constraints:
• All shaded cells are connected.
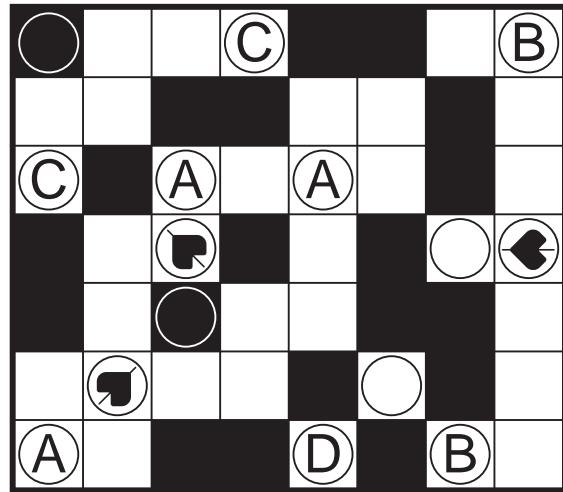
• Don't make these patterns:

Example 3

Example by Elyot Grant
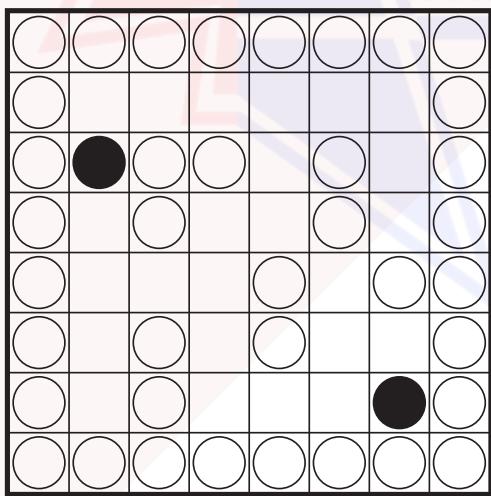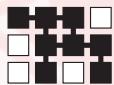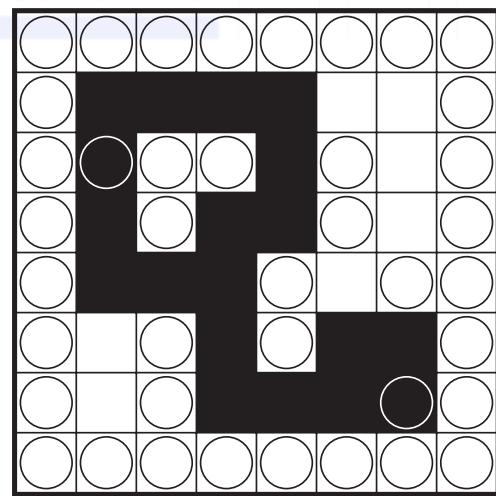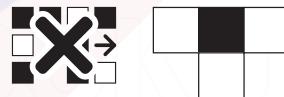
Example 4

Example by Elyot Grant

Constraints:
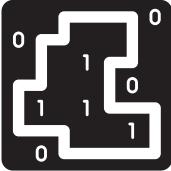
• All shaded cells are connected.

• Don't make this pattern:

OCTOBER 20

14:55 – 15:35

14. MELON'S PUZZLES
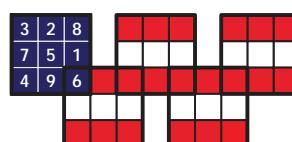
|		
1. Castle Wall	20	
2. Castle Wall (Off by One)	35	
3. Castle Wall	45	
4. Castle Wall (Unequal Lengths)	50	
5. Castle Wall	105	
6. Castle Wall (Antisymmetry)	145	
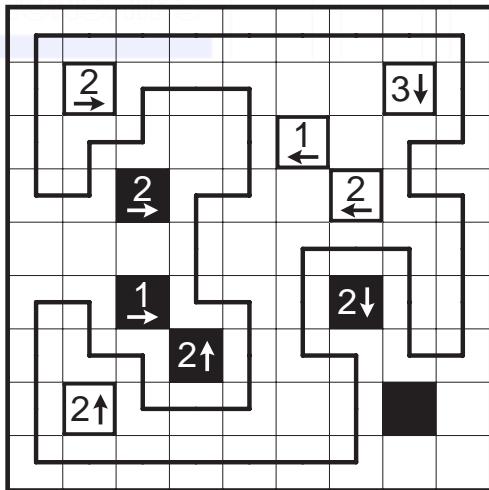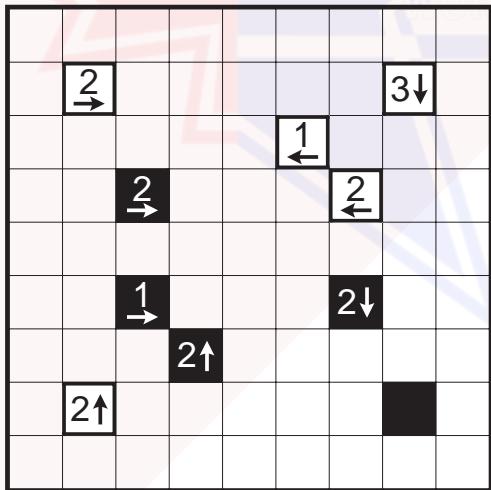
14.1, 14.3, 14.5 Castle Wall (20, 45, 105 Points)
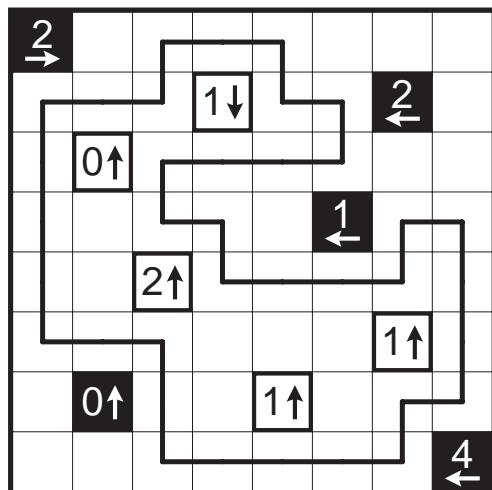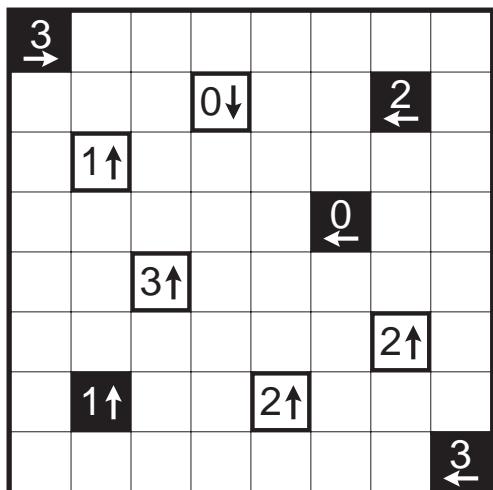
Example by Serkan Yürekli (GMPuzzles.com)

Draw a single closed loop (without intersections or crossings) passing through some empty cells in the grid. The grid contains some bordered or colored cells that cannot be part of the loop. Black cells must be outside the loop; white cells (with heavy borders) must be inside the loop. Numbers and arrows refer to the total sum of the lengths of loop segments in the given direction. (An equivalent way to understand these values is to count the number of cell borders crossed by the loop in that direction.)

14.2 Castle Wall (Off by One) (35 Points)

Example by Serkan Yürekli (GMPuzzles.com)

Variation of Castle Wall rules. Every given clue is lying. The correct value is either one more or one less than the given clue.
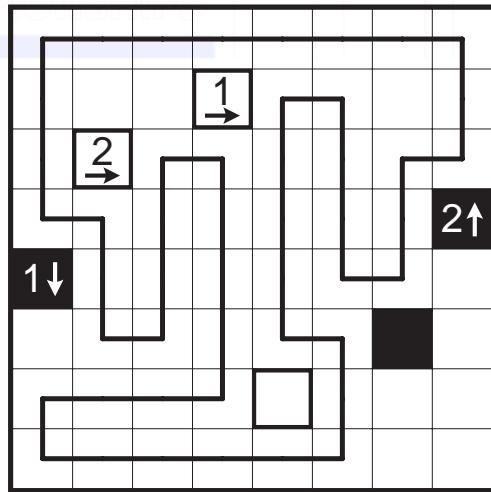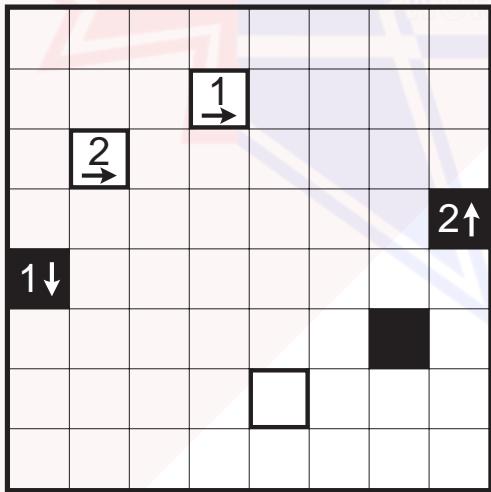
14.4 Castle Wall (Unequal Lengths) (50 Points)

Example by Serkan Yürekli (GMPuzzles.com)
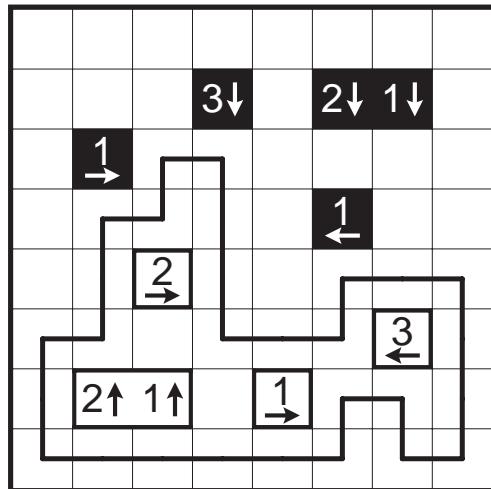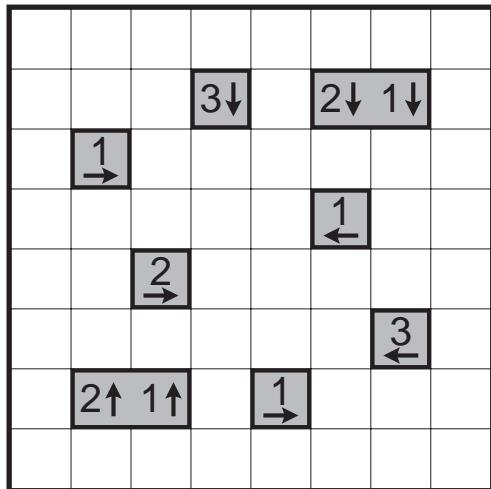
Standard Castle Wall rules, but any two consecutive line segments cannot have the same length (i.e., on both sides of any turn, the loop must travel different lengths).
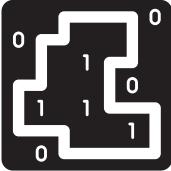
14.6 Castle Wall (Antisymmetry) (145 Points)

Example by Serkan Yürekli (GMPuzzles.com)

Standard Castle Wall rules, but none of the clue colors are given. For each symmetric pair of clue cells, one cell is white and the other cell is black.
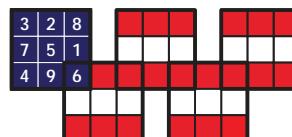
15. ALL OVER THE MAP

1. Numberlink   65
2. Rail Pool   115
3. Country Road   65
4. Masyu (Ice)   140
5. Masyu (Triangular)   155
6. Slitherlink   110
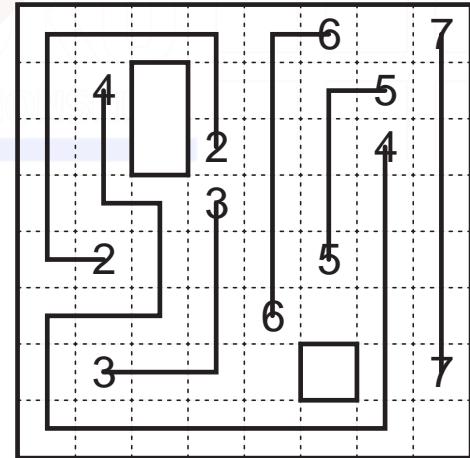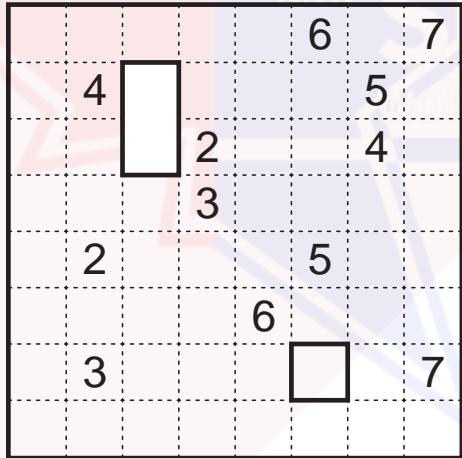
15.1 Numberlink (65 Points)

Example by Serkan Yürekli (GMPuzzles.com)
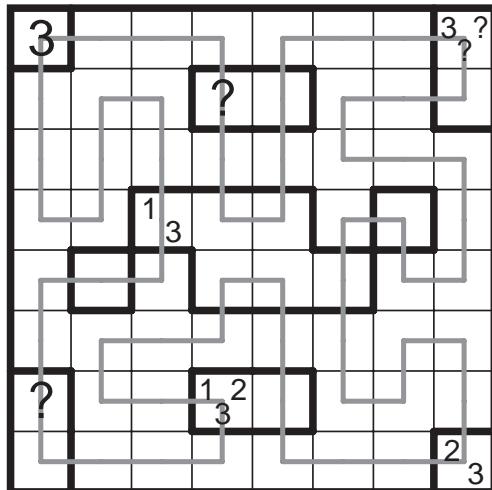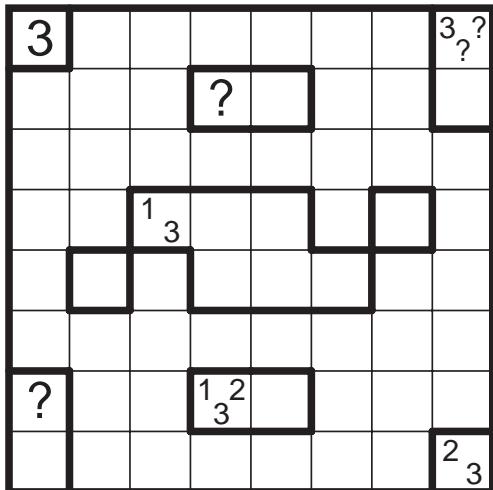
Connect each pair of identical numbers with a path passing through edge-adjacent cells. No cell may be used on more than one path.

15.2 Rail Pool (115 Points)

Example by Serkan Yürekli (GMPuzzles.com)

Draw a single, non-intersecting loop that passes through the centers of all cells, including clue cells. Clues represent all of the different lengths of the straight line segments that pass through all cells within the region, either partially or fully contained by that region. Each number within a region must be represented by at least one line segment. Each "?" represents a positive integer; if a clue cell has numbers and "?"s or multiple "?s", all numbers and "?"s in that clue must be different from each other.
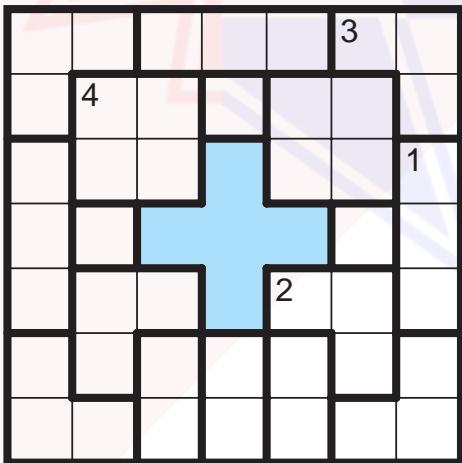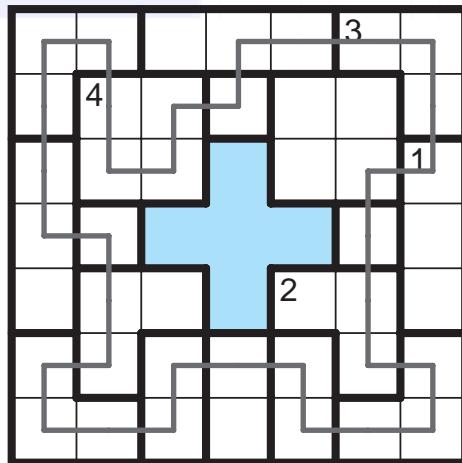
15.3 Country Road (65 Points)

Example by Serkan Yürekli (GMPuzzles.com)

Draw a single, non-intersecting loop in the grid that enters and exits each bold region exactly once. If a number clue is given in a region, that number indicates the exact number of cells used by the loop in the region. Unused cells cannot be orthogonally adjacent across different regions. The loop cannot pass through the colored regions and those regions cannot be considered empty. (The puzzle contains an extra blue cross-hatched region for graphical purposes which is not part of the puzzle and should not be considered when considering empty regions.)
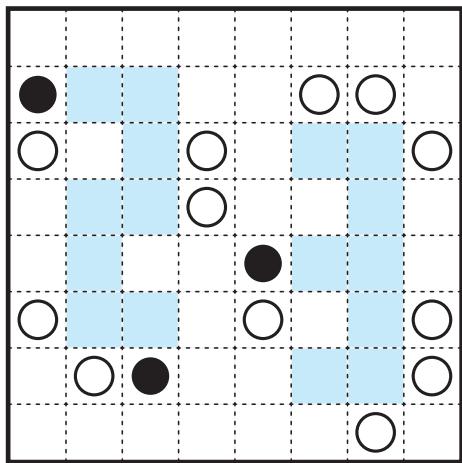
15.4 Masyu (Ice) (140 Points)

Example by Serkan Yürekli (GMPuzzles.com)
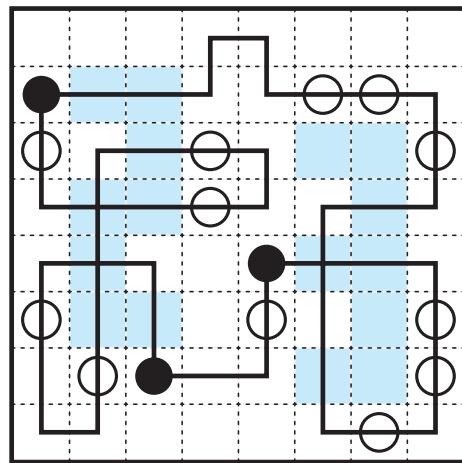
Draw a single loop that passes through all circled cells. The loop must go straight through the cells with white circles, with a turn in at least one of the cells immediately before/after each white circle. The loop must make a turn in all the black circles, but must go straight in both cells immediately before/after each black circle.

Additionally, some shaded cells representing iced lakes are given. If the loop passes through a shaded cell, it cannot make a turn (there is no requirement or restriction on passing through any ice cell). The loop may cross itself orthogonally on the iced cells but otherwise does not touch or retrace itself. (White cells are restricted to at most one visit, as per usual.)
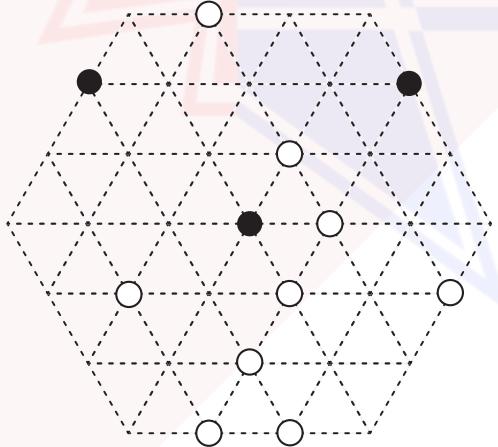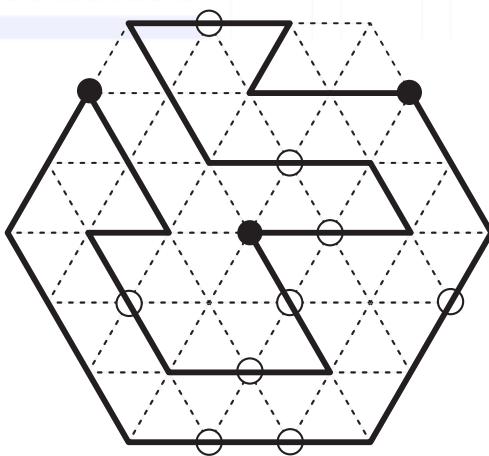
15.5 Masyu (Triangular) (155 Points)

Example by Zoltán Horváth

Draw a single, non-intersecting loop that passes through all circled cells. The loop must go straight through the cells with white circles, with a turn in at least one of the cells immediately before/after each white circle. The loop must make a turn (all turns other than 180 degrees) in all the black circles, but must go straight in both cells immediately before/after each black circle.

15.6 Slitherlink (110 Points)

Example by Serkan Yürekli (GMPuzzles.com)

Draw a single, non-intersecting loop on an irregular grid that can only follow the lines between the dots. Numbers inside a cell indicate how many of the edges of that cell are part of the loop.
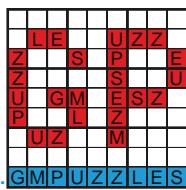
16. THE BREADTH OF AMERICA
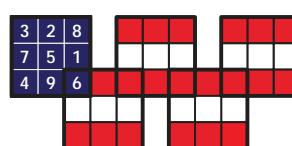
1. Inturnal	20	
2. Inturnal	30	
3. Inturnal	55	
4. Disorderly Loop	35	
5. Disorderly Loop	45	
6. Disorderly Loop	100	
7. Cross Border Parity Loop	25	
8. Cross Border Parity Loop	50	
9. Cross Border Parity Loop	105	
10. Exercise	20	
11. Exercise	25	
12. Exercise	140	
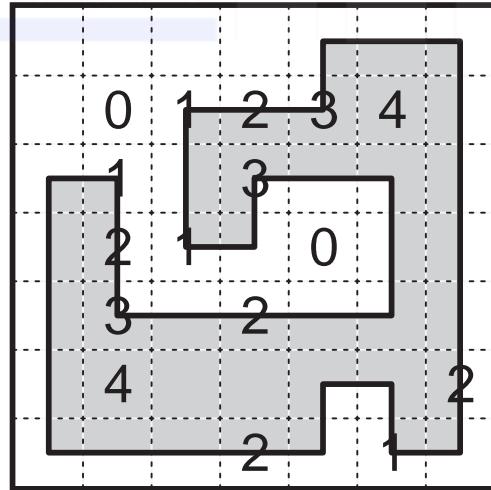
16.1, 16.2, 16.3 Inturnal (20, 30, 55 Points)   Example by Alan Fetters
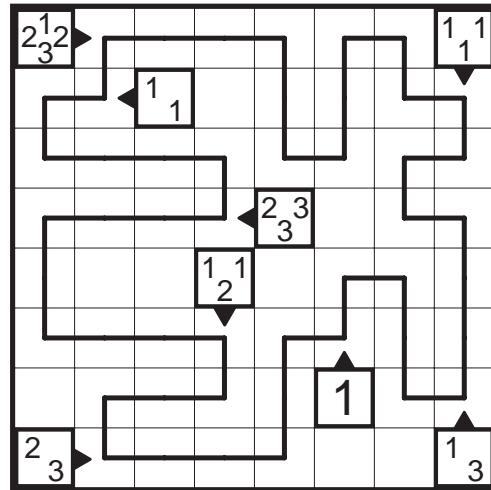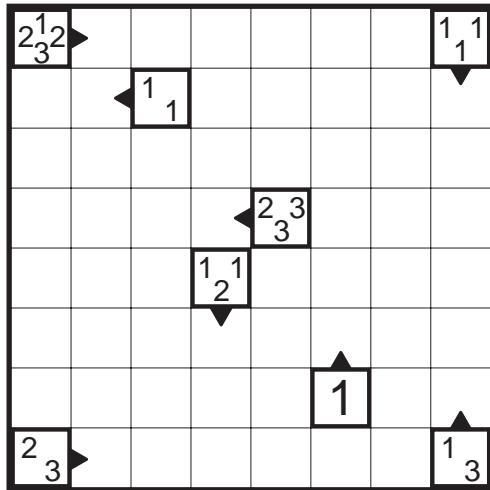
Draw a single, non-intersecting loop that only consists of horizontal and vertical segments between the dots. Numbers inside a square (cell) indicate the number of quadrants of that square that are inside the loop.

16.4, 16.5, 16.6 Disorderly Loop (35, 45, 100 Points)   Example by Serkan Yürekli (GMPuzzles.com)

Draw a single, non-intersecting loop through the centers of some cells. Clued cells may not be used by the loop. Clues represent the lengths of the next N line segments appearing in the loop, not necessarily in order, starting with a line in the cell adjacent to the clue in the direction of its arrow and moving in the direction of the arrow, where N is the amount of numbers in the clue.
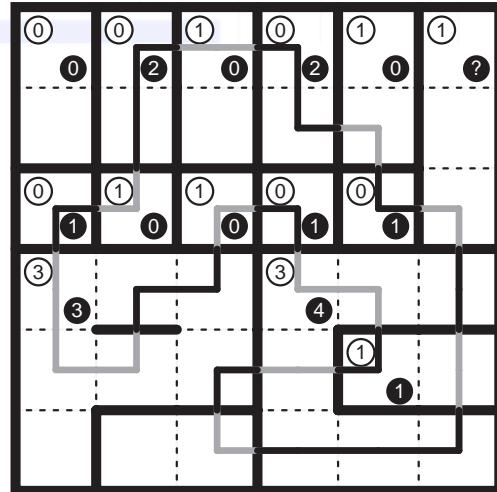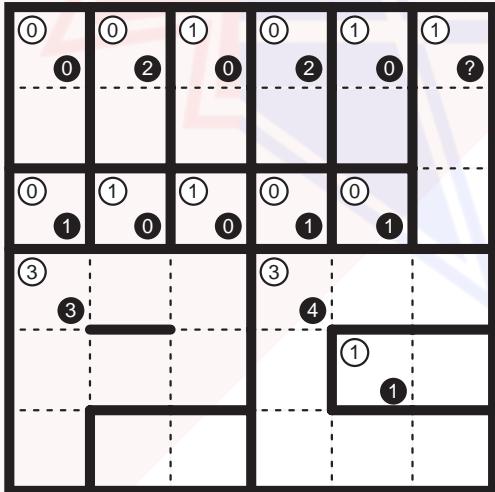
16.7, 16.8, 16.9 Cross Border Parity Loop (25, 50, 105 Points)   Example by Craig Kasper
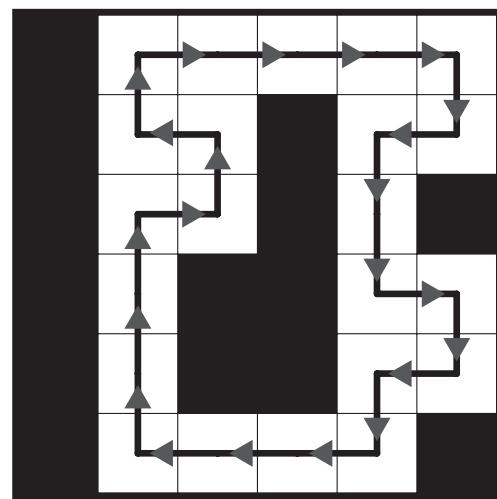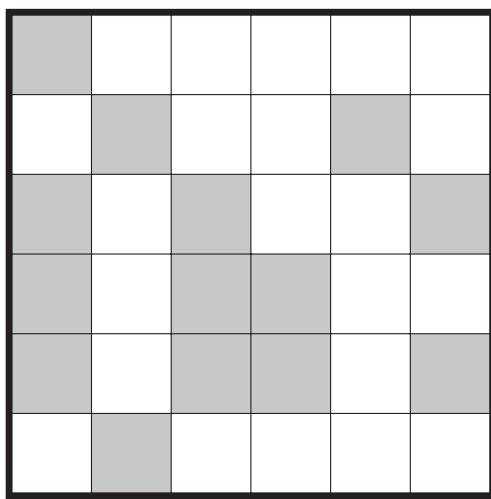
Draw a single, non-intersecting loop that has two states, which are white and black. The puzzle grid has heavily shaded borders, which define areas in the grid. Whenever the loop crosses a border (including borders inside an area), it changes state from white to black or from black to white. A black circled clue provides the number of cells in each area that the loop traverses in the black state, and a white circled clue provides the number of cells in each area that the loop traverses in the white state. Each "?" represents an unknown integer, zero or larger.

16.10, 16.11, 16.12 Exercise (20, 25, 140 Points)   Example by Serkan Yürekli (GMPuzzles.com)

The plan of a room is given where white cells are empty and each gray cell has a large stone. Draw a single, non-intersecting, directional loop that starts at a white cell and opens a clear path around the room by pushing some stones on its path (and only those on its path) into empty cells. Stones move exactly one cell in the direction from which they were pushed and can only be moved once. Stones cannot push other stones. The finished loop must pass through all empty cells in the grid.

OCTOBER 20
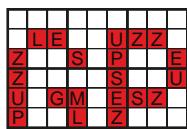
18:10 - 18:40**

17. CANADIAN SUMMITS

1. Canadian Summits	300	
2. Canadian Summits	300	
3. Canadian Summits	300	
4. Canadian Summits	300	
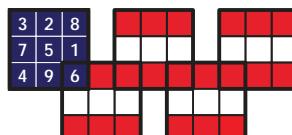
**approximate times; team rounds will be allowed to run until at least 2 teams are finished.

17.1-4 Fuzuli (300 + 300 + 300 + 300 Points)   Example by Cihan Altay

With the 16 unique pieces provided, assemble four separate Fuzuli puzzles. Each Fuzuli has a square grid, visible grid lines, a thick border, and definitive clues on some cells. No clues on this completed puzzle may be altered. Finally, transfer these four puzzles onto the puzzle sheets and solve them. Each puzzle uses a set of five distinct digits, for you to discover.
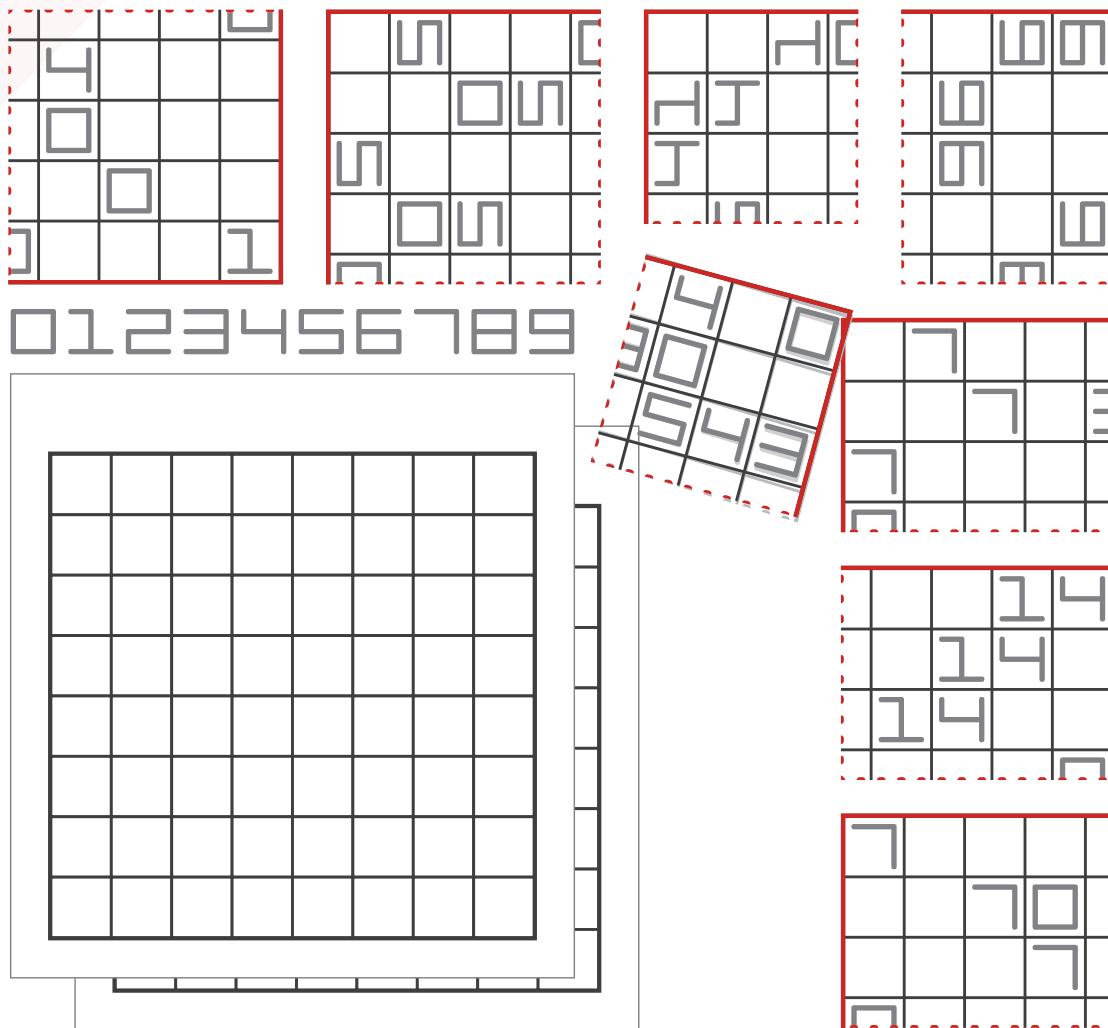
Notes

Pieces are printed on transparent sheets, so they are reversible. All dashed lines are joining lines; all thick lines are grid borders. Reverse-engineering the grids is not possible. Any miniscule variance along the edges is purely incidental.

Fuzuli
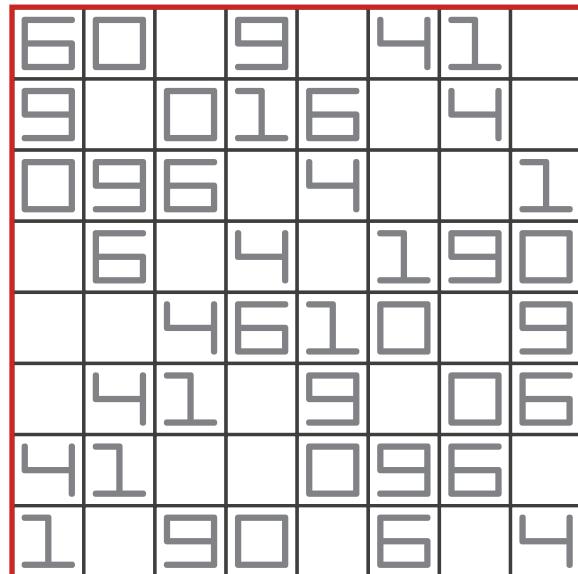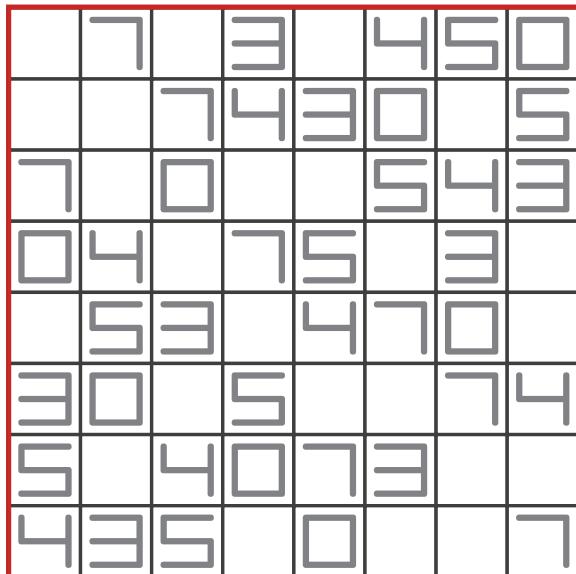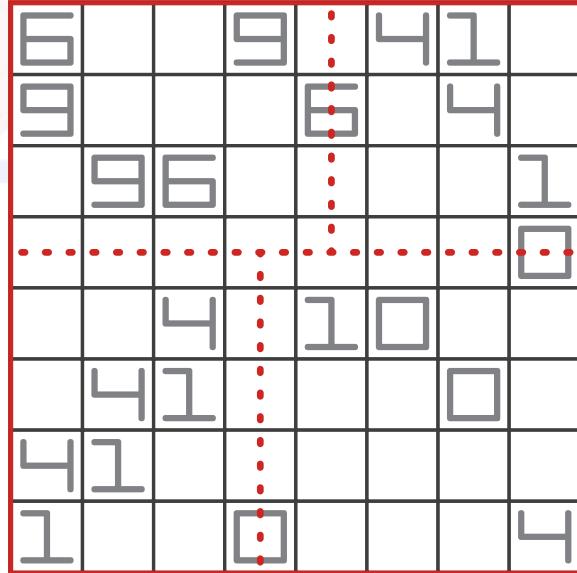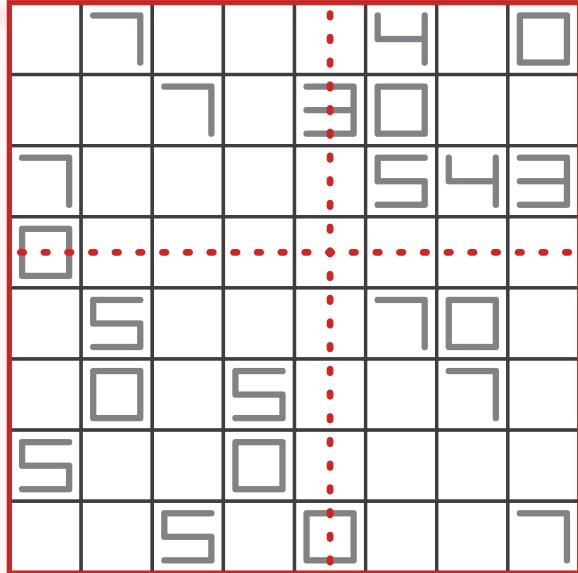
Using five distinct digits, fill in some cells so that each one of these digits appears exactly once in every row and column of the grid. No 2×2 square can be completely filled.
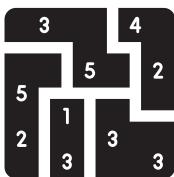
The following example employs 8 pieces to form two grids. The solution ends up having one grid with the set {0, 3, 4, 5, 7} and the other with {0, 1, 4, 6, 9}.

Pieces

OCTOBER 21

09:00 – 09:40

18. ROGER'S BAG
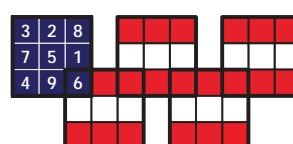
1. Cave	20	
2. Cave (No 2×2)	40	
3. Cave	55	
4. Cave (Diagonal)	70	
5. Cave	100	
6. Cave	115	
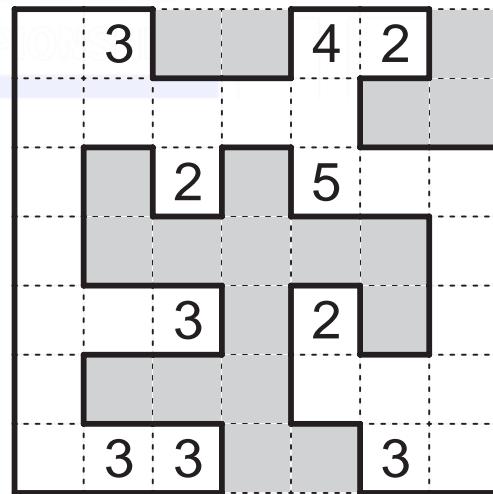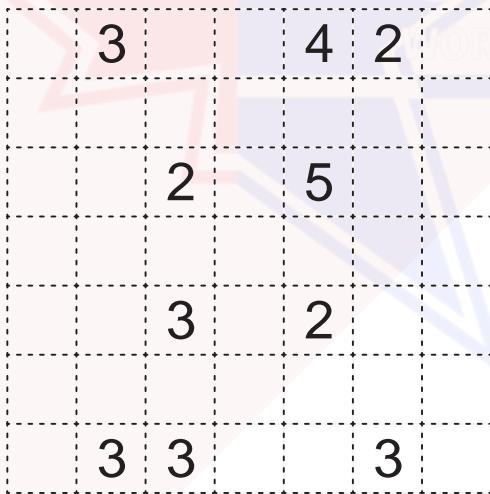
18.1, 18.3, 18.5, 18.6 Cave (20, 55, 100, 115 Points)
Example by Serkan Yürekli (GMPuzzles.com)
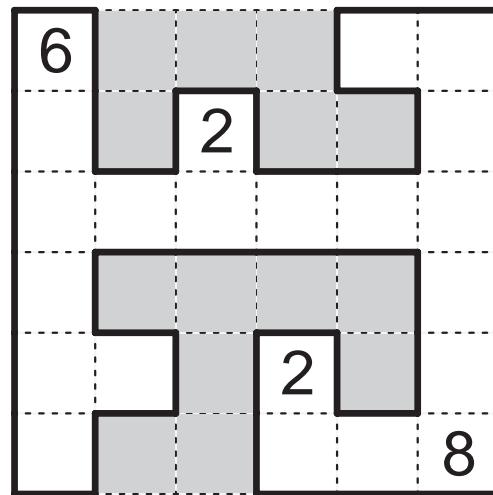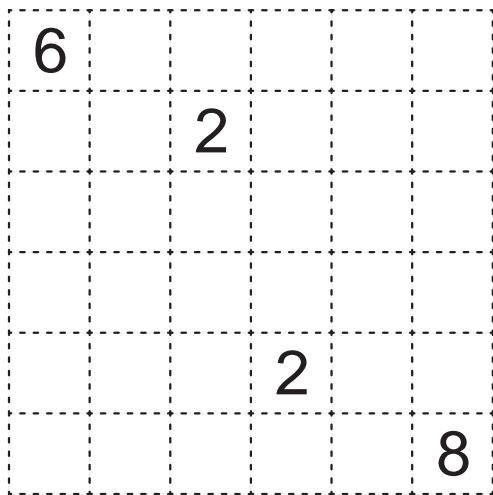
Shade some cells to leave behind a single connected group — the cave — with no enclosed, shaded cells. In other words, all shaded cells must be connected by other shaded cells to an edge of the grid. All numbered cells must be a part of the cave, with each number indicating the total count of cells connected vertically and horizontally to the numbered cell **including the cell itself**.

18.2 Cave (No 2×2) (40 Points)
Example by Roger Barkan

Standard Cave rules. Additionally, no 2×2 square may be entirely shaded or entirely unshaded.
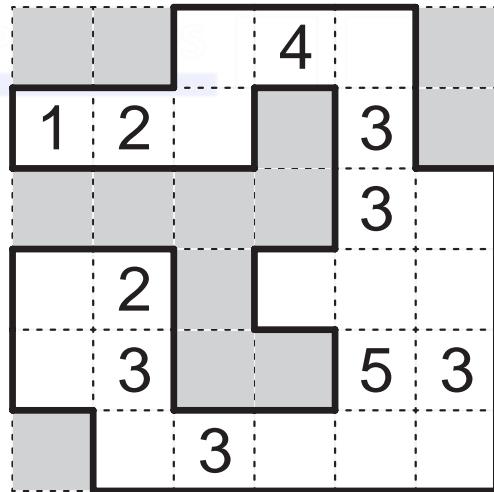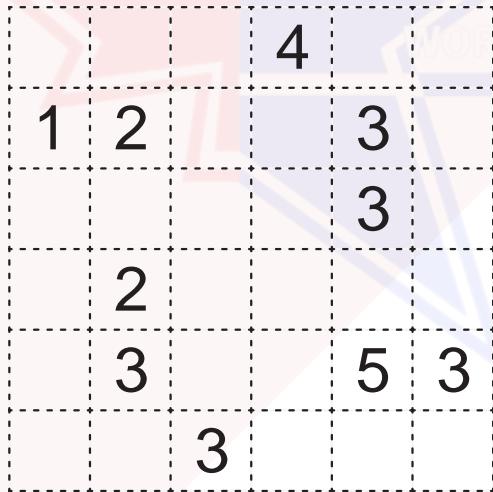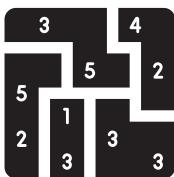
18.4 Cave (Diagonal) (70 Points)

Example by Roger Barkan

Variation of Cave. Number clues give the total count of cells connected diagonally to a numbered cell **including the cell itself**.
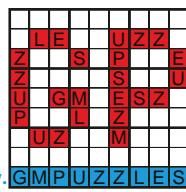
OCTOBER 21

09:50 – 10:35

19. HOLESOME DIET
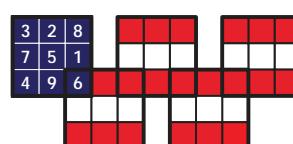
1a. Holey Fillomino	40	
1b. Holey Fillomino	40	
1c. Holey Fillomino	40	
1d. Holey Fillomino	40	
2a. Holey Araf	70	
2b. Holey Araf	70	
2c. Holey Araf	70	
2d. Holey Araf	70	

Rules

In this round, you will be given four puzzles on four different layers for each genre. Your goal is to overlap the four layers in the correct order, without any rotation or reflection, for each genre and solve each of the puzzles. The layers have holes, through which the lower layer can be seen. The holes on the lowermost layer serve as black cells (i.e., empty cells where no numbers can be written and that cannot be part of any region) for the puzzle on that layer. A hole in any layer other than the lowermost layer will show whatever is in the cell on the layer immediately below. If there is a number, you have to use that number on the layer you are on. You should be aware that even if the number or anything you add appears through a hole, that cell could be anything on the layer you are on, because being seen only applies to the clues given.

Answer Format: Fasten your solution (even if it is not completely finished) on all four sides with the paper clips provided and put it back in the envelope given to you at the beginning of the round.

19.1abcd Holey Fillomino (40 + 40 + 40 + 40 Points)   Example by Fatih Kamer Anda

(as in 1.7/1.8) Divide the grid along the dotted lines into regions called polyominoes so that no two polyominoes with the same area share an edge. Inside some cells are numbers; each number must represent the area of the polyomino it belongs to. A polyomino may contain zero, one, or more of the given numbers.

A
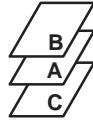
3		3	
HOLE HOLE HOLE	3	HOLE HOLE HOLE	
3			2
HOLE HOLE HOLE	3	HOLE HOLE HOLE	
2		3	

B

		1	
1	HOLE HOLE HOLE		2
	2	HOLE HOLE HOLE	1
	2	HOLE HOLE HOLE	2
	1	2	

C

	3	4	HOLE HOLE HOLE	3
		HOLE HOLE HOLE		
3	HOLE HOLE HOLE	4	3	

```
 B
 A
 C
```

C - First Floor

4	4	4	3	3
3	3	4	HOLE HOLE HOLE	3
1	3	HOLE HOLE HOLE	3	1
3	HOLE HOLE HOLE	4	3	3
3	3	4	4	4

A - Second Floor

2	3	1	3	3
2	3	3	HOLE HOLE HOLE	3
3	2	2	1	2
3	HOLE HOLE HOLE	3	3	2
3	2	2	3	1

B - Top Floor

3	3	1	3	3
1	3	2	2	3
3	2	3	1	2
3	2	3	3	2
3	1	2	2	1
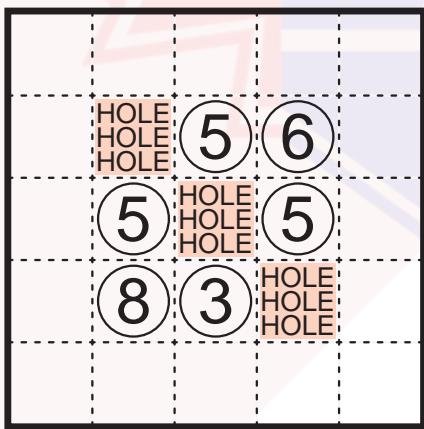
19.2abcd Holey Araf (70 + 70 + 70 + 70 Points)
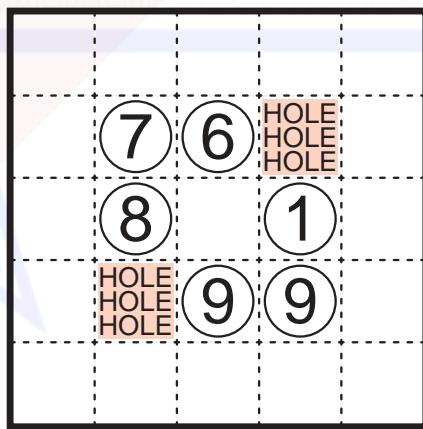
Example by JinHoo Ahn (GMPuzzles.com)

Divide the grid into some regions formed of edge-adjacent squares. Each cell is part of one region, and each region should contain exactly two given numbers. Each region must have an area that is strictly between those numbers. (This means, for two number clues A and B with A < B, the area C fulfills A < C < B.)
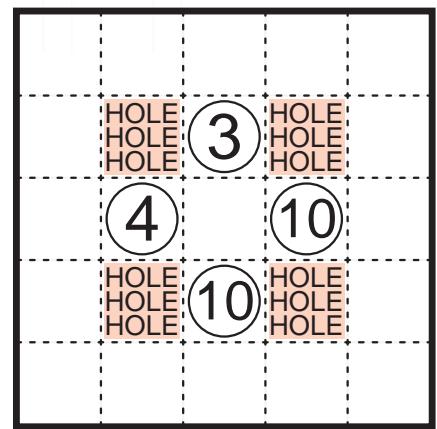
D
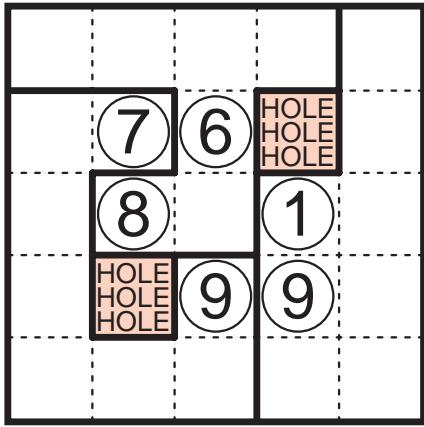
E
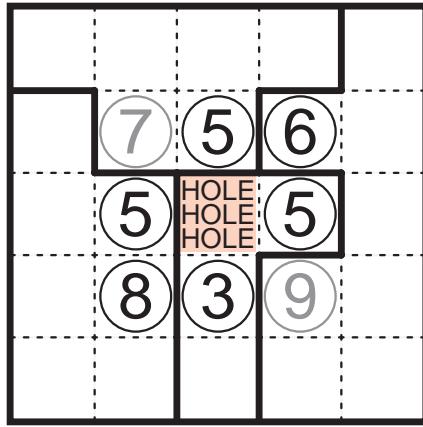
F
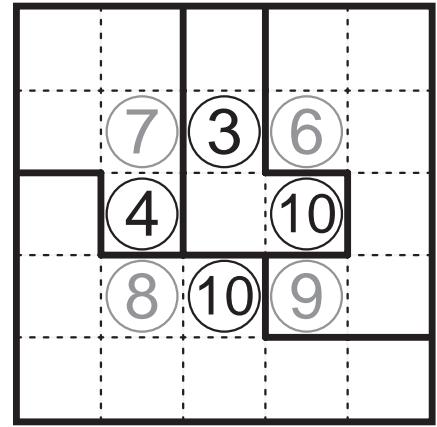
E - First Floor
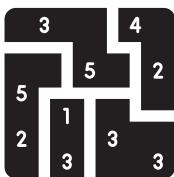
D - Second Floor

C - Top Floor
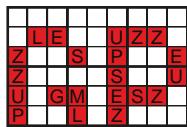
OCTOBER 21

10:45 – 11:45

20. PENTOMINOUS+
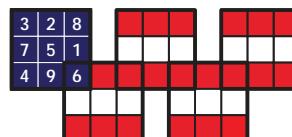
1. Pentominous + Star Battle	30	
2. Pentominous + Star Battle	95	
3. Pentominous + Spiral Galaxies	25	
4. Pentominous + Spiral Galaxies	120	
5. Pentominous + Battleships	40	
6. Pentominous + Battleships	85	
7. Pentominous + Skyscrapers	40	
8. Pentominous + Skyscrapers	95	
9. Pentominous + Snake	20	
10. Pentominous + Snake	50	
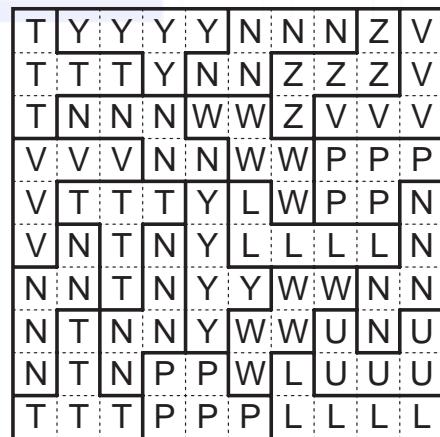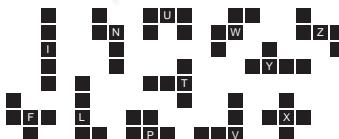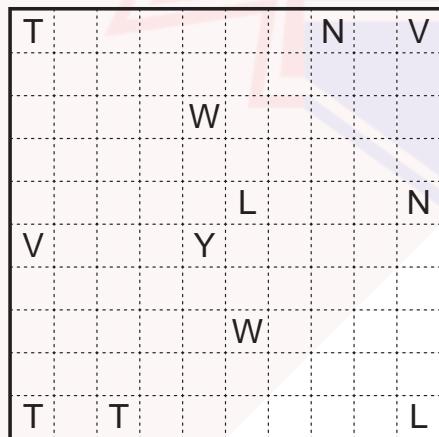
General Rule for Pentominous:

Example by Grant Fikes (GMPuzzles.com)

Divide the grid into pentominoes (five-cell regions) so that no two pentominoes of the same shape (including rotations/reflections) share an edge. A cell with a letter in it must be part of the pentomino shape normally associated with that letter. An inventory of pentominoes is given below the puzzle but not all shapes must be used.

Note: There is no need to have letters in your solution, only markings so that the regions of the pentominoes are all clear.
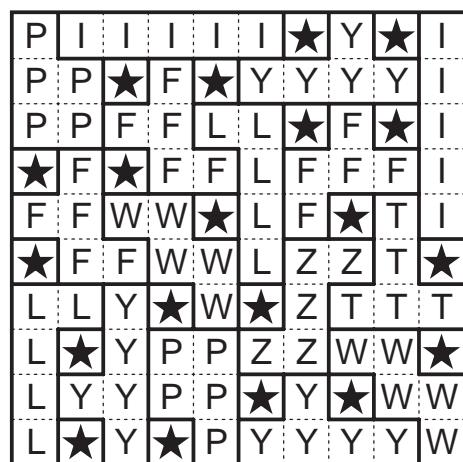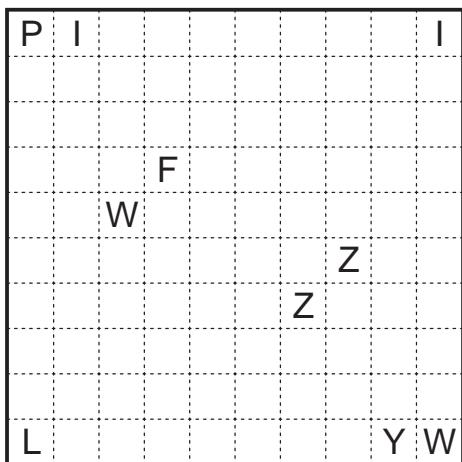
20.1, 20.2 Pentominous + Star Battle (30, 95 Points)

Example by Grant Fikes (GMPuzzles.com)

Combination of Pentominous and Star Battle (see 5.1). Fill some cells with stars so that each row and bold region contains the indicated number of stars. Stars cannot be placed in adjacent cells that share an edge or corner. Then divide the rest of the grid into regions each containing 5 cells. Regions with the same shape (including rotations/reflections) cannot share an edge. A cell with a letter in it must be part of the pentomino shape normally associated with that letter.

2★
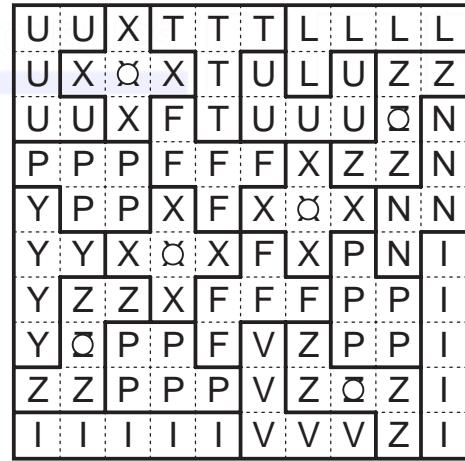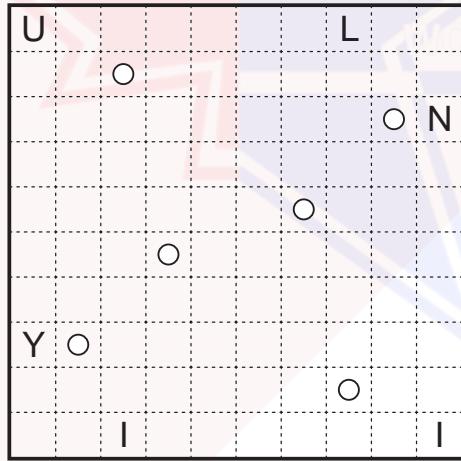
20.3, 20.4 Pentominous + Spiral Galaxies (25, 120 Points)   Example by Grant Fikes (GMPuzzles.com)
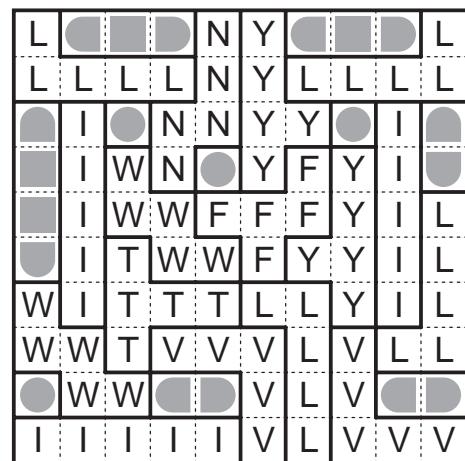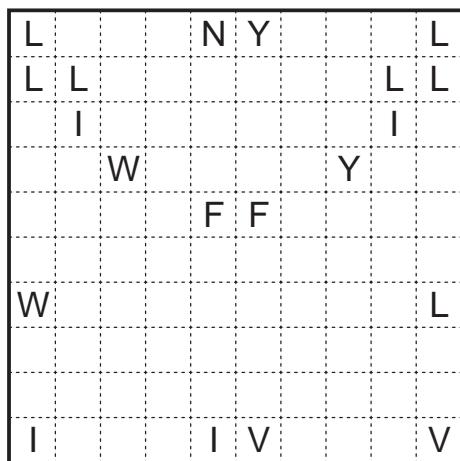
Standard Pentominous rules. Additionally, some circle clues are given in the grid which must be at the center of symmetry for a rotationally-symmetric pentomino shape.

20.5, 20.6 Pentominous + Battleships (40, 85 Points)   Example by Grant Fikes (GMPuzzles.com)

Combination of Pentominous and Battleships (see 1.3). Locate the indicated fleet in the grid. Each segment of a ship occupies a single cell. Ships can be rotated. Different ships cannot be placed in adjacent cells that share an edge or corner. Then divide the rest of the grid into regions each containing 5 cells. Regions with the same shape (including rotations/reflections) cannot share an edge. A cell with a letter in it must be part of the pentomino shape normally associated with that letter.
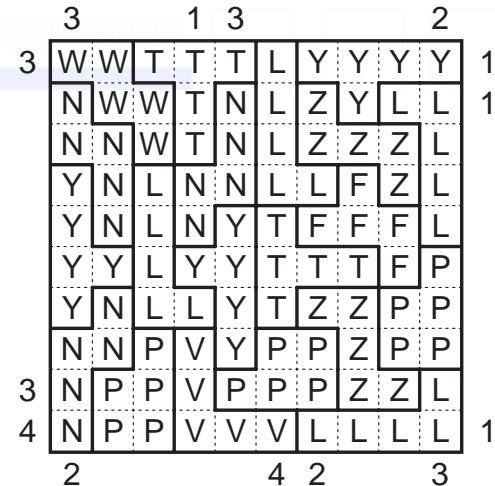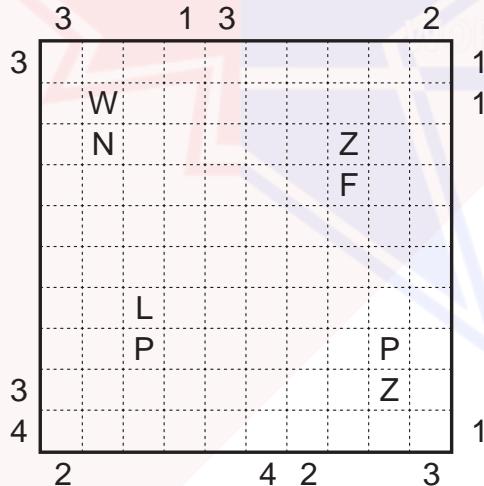
20.7, 20.8 Pentominous + Skyscrapers (40, 95 Points)   Example by Grant Fikes (GMPuzzles.com)
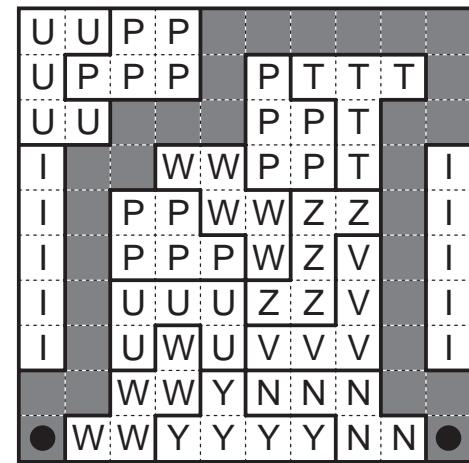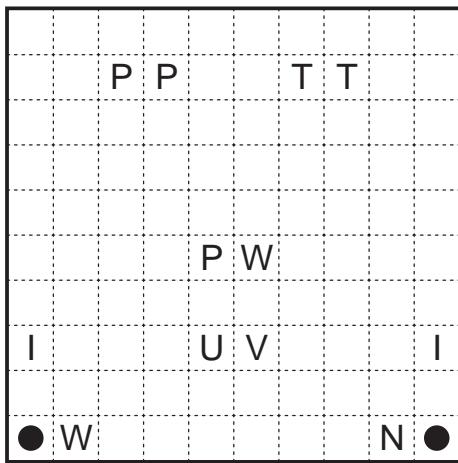
Standard Pentominous rules. Additionally, numbers outside the grid show the number of separate pentomino segments visible in that direction. A segment of length N in a given direction is taken as a building of height N. Buildings of height N block the view of all buildings behind them of equal or lesser height.

20.9, 20.10 Pentominous + Snake (20, 50 Points)   Example by Grant Fikes (GMPuzzles.com)

Combination of Pentominous and Snake. Locate a snake (a 1-cell wide path) of unknown length in the grid, whose head and tail are given. The snake does not touch itself, even diagonally. Then divide the rest of the grid into regions each containing 5 cells. Regions with the same shape (including rotations/reflections) cannot share an edge. A cell with a letter in it must be part of the pentomino shape normally associated with that letter.

OCTOBER 21
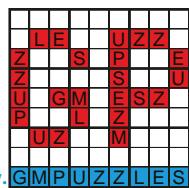
13:45 - 15:00

21. TRICK OR TREAT

1. Trick	50		1. Treat	60
2. Trick	115		2. Treat	145
3. Trick	195		3. Treat	255
4. Trick	290		4. Treat	390
5. Trick	400		5. Treat	550
6. Trick	525		6. Treat	735
7. Trick	665		7. Treat	945
8. Trick	820		8. Treat	120
9. Trick	1000		9. Treat	1500
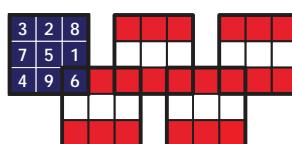
** approximate times; team rounds will be allowed to run until at least 2 teams are finished.

ROUND 21: TRICK OR TREAT

Rules

Halloween is a traditional end of October event throughout North America where children dress up in costumes and knock on people's doors asking for candy with the phrase "Trick or Treat". In this team round we have taken some of the basic elements of the holiday and added our own tricks and treats to share in puzzle form.

Teams will be given a set of 9 wearable face masks, a set of 6 pencils with different codes printed on them, 2 Halloween trick or treat bags, and 9 puzzles to solve. Around the room will be nine "houses" (i.e., tables with a costumed judge) to go trick-or-treating at. When teams present a finished puzzle at the house, they may get (1) a trick along with a "try again" grid, (2) a treat of some form, or (3) nothing. The result depends on the puzzle solution and wearing the right (matching) mask as the housekeeper. Earning either tricks or treats is worth points, but to earn complete marks the team must get 9 treats, one from every house. These treats are edible candies and the team may eat the candies but should keep the wrappers.

Tricks and treats are both worth a progressive value of points, and teams will earn the following point totals for a certain number of tricks and treats when time ends. (Note that all papers will be collected in a team envelope and fully graded after the round to assign these points; even though a trick or a treat might have been given out by the 'house' judge during the round, they are doing only a quick check of the grid and not fully marking the papers in the interest of time).

Points	1	2	3	4	5	6	7	8	9
Tricks	50	115	195	290	400	525	665	820	1000
Treats	60	145	255	390	550	735	945	120	1500
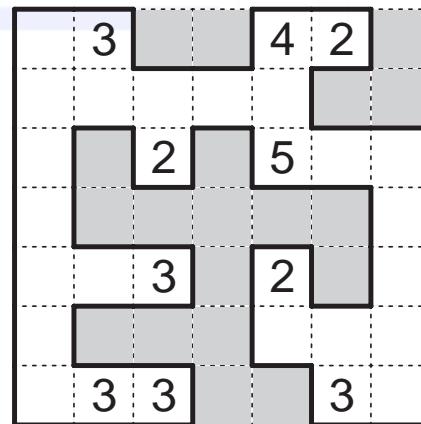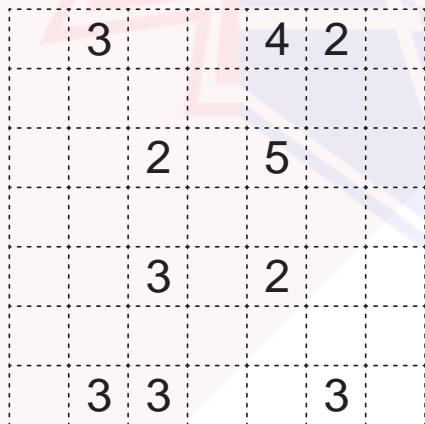
21.1 The Bat Cave (Cave)

Example by Serkan Yürekli (GMPuzzles.com)

The Bat naturally lives in a dark place and uses echolocation to map the surroundings by noting where sound bounces off the walls.

Shade some cells to mark the Bat cave where the unshaded cells form a single connected group with no enclosed, shaded cells. In other words, all shaded cells must be connected by other shaded cells to an edge of the grid. All numbered cells must be a part of the cave, with each number indicating the total count of cells connected vertically and horizontally to the numbered cell including the cell itself.
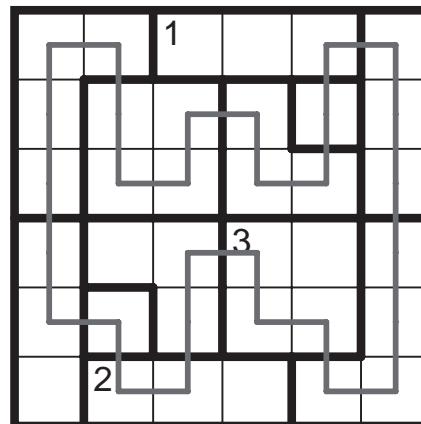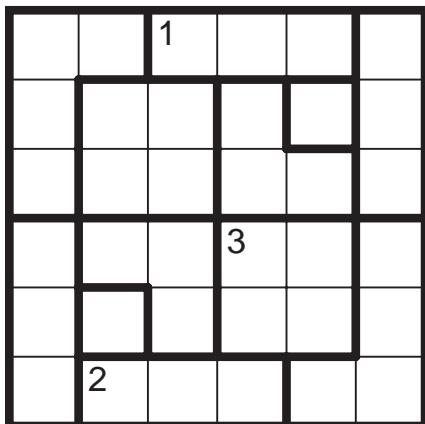
21.2 The Cat's Tangle of Yarn (Country Road)

Example by Serkan Yürekli (GMPuzzles.com)

The Cat chases her ball of yarn so much it seems to have looped back on itself.

Draw a single, non-intersecting loop in the grid that enters and exits each bold region exactly once. If a number clue is given in a region, that number indicates the exact number of cells used by the loop in the region. Unused cells cannot be orthogonally adjacent across different regions. The loop cannot pass through the colored regions and those regions cannot be considered empty.

21.3 The Devil's Soul Search (Variety Word Search)   Example by Thomas Snyder (GMPuzzles.com)

The Devil's got a sympathy for things that match his name in a peculiarly devilish way.
Locate the given words in the grid, running in one of eight possible directions horizontally, vertically, or diagonally. Some words may contain a space or hyphen; ignore these when locating the words. Something special must be done to the words to find them in the grid (in the given example, the first letter has been moved to the end of the word; the competition puzzle will have a different transformation).

S	X	I	N	W	Y
A	N	E	O	D	P
O	Z	T	Q	I	E
F	U	O	S	V	X
J	H	R	E	E	T
G	O	D	F	F	T

ONE
TWO
THREE
FOUR
FIVE
SIX

S	X	I	N	W	Y
A	N	E	O	D	P
O	Z	T	Q	I	E
F	U	O	S	V	X
J	H	R	E	E	T
G	O	D	F	F	T

21.4 Frankenstein's Monster's Body (Non-Consecutive Fillomino)   Example from GMPuzzles.com

Frankenstein's Monster's parts are very carefully put together, making sure nothing very similar to itself is touching.
Divide the grid along the dotted lines into regions ("Frankenstein's Monster's parts") so that no two regions with the same area, **or with areas that differ by one,** share an edge. Inside some cells are numbers; each number must represent the area of the region it belongs to. A region may contain zero, one, or more of the given numbers. (It is possible for a "hidden" region — a region without any of the given numbers — to contain a value that is not present in the starting grid such as a 6 in a puzzle with only 1-5 clues.)

2		3		2		3
			6			
4		6		1		5
4		3		2		1

| 2	8	3	6	2	9	3
2	8	3	6	2	9	3
8	8	3	6	6	9	3
4	8	6	6	1	9	5
4	8	3	9	9	9	5
4	8	3	9	2	5	5
4	8	3	9	2	5	1
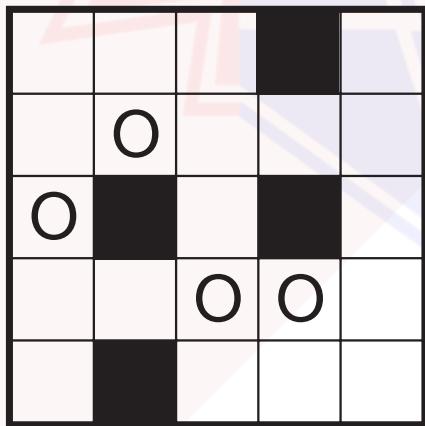
21.5 The Ghost's Spoooooky Party (Scrabble)   Example by Mike Selinker

The Ghost is gathering all of his scary friends from around the world for a party; some of the seats have already been marked so everyone has an easy time fitting in.

Enter all of the given monsters' names into the grid criss-cross style, reading either across or down. Some names may contain a space; ignore these when entering the words in the grid. No other strings should be formed except for the guest names. Words cannot use the blackened cells. All instances of the letter O have been given in the grid.

ANKOU
BAUK
GHOST
HON MA
SPOOK

21.6 The Mummy's Wrappings (Observation Puzzle)   Example by Mike Selinker

The Mummy's wrappings have fallen to the floor, revealing a number of fascinating hieroglyphs. Use your math skills to translate the hieroglyphs appropriately.

Count how often each symbol appears visibly in whole or in part across the given strips and then solve the given equation to get an integer answer.

$$(\text{🦅} \times \text{🐒})^{\text{🪲}} + \text{🐍} = 42$$
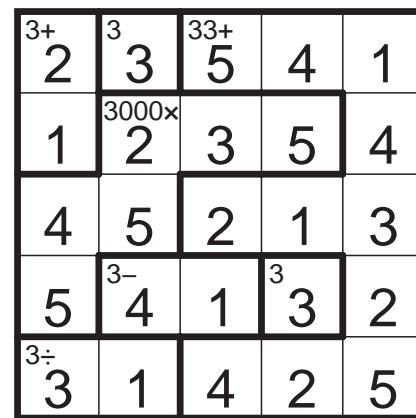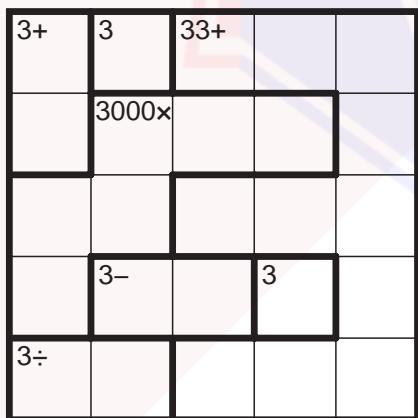
21.7 The Owl Goes Hoo Hoo (TomTom)

Example by Thomas Snyder (GMPuzzles.com)

The wise Owl seems to ask "Who? Who?" as they calculate where the best food will be.
Insert a number from 1 to N into each cell in the N by N grid so that no number repeats in any row or column. Also, the number in the upper-left corner of each bold cage indicates the value of a mathematical operation (addition, subtraction, multiplication, division) applied successively to all numbers in the cage, starting with the largest number for subtraction and division (e.g. 1,2,4 with subtraction is a 1- clue as 4-2-1 = 1). The operation may or may not be given in the cage, but at least one of the four operations must apply. Numbers can repeat within a cage.

{1–5}
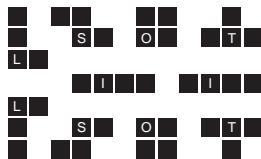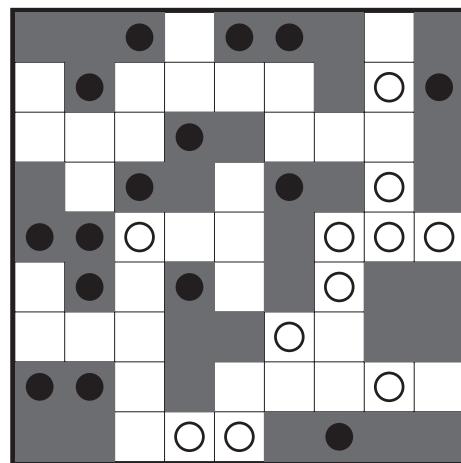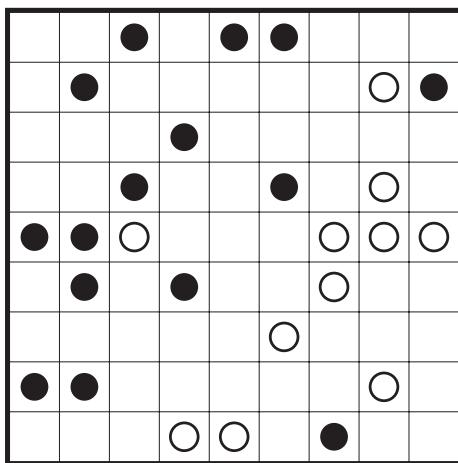
## 21.8 The Pirate's Treasure (Statue Park)

Example by Serkan Yürekli (GMPuzzles.com)

The Pirate has buried his unusually shaped treasures somewhere in this beautiful park.
A bank of unusually shaped treasures is given with the grid. Locate each of the treasures exactly once in the grid, with rotations and reflections allowed. No two treasures can overlap or be orthogonally adjacent, and all of the space not occupied by treasures must be connected. Black circles in the grid represent parts of treasures, and white circles represent spaces that may not be part of a buried treasure.
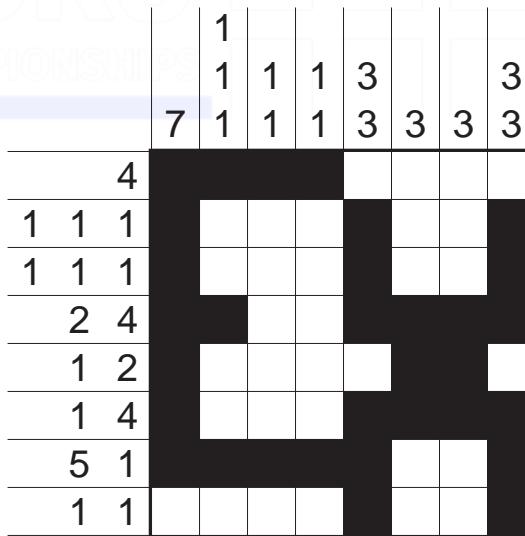
21.9 The Witch's Brew (Nonogram)

Example by Thomas Snyder (GMPuzzles.com)

The Witch puts all manner of things, big and small, into her brew, hoping to see something meaningful.
Shade some empty cells black to complete the witch's brew. Numbers to the left/top of the grid represent the groups of consecutive black cells which are in that row/column in order, either from left to right or from top to bottom. Shaded groups must be separated by at least one white cell.

OCTOBER 21

15:10 – 15:40

22. CEREMONIAL FOLDING
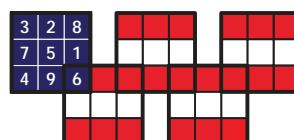
1. Image   ?

2. Image   ?

3. Image   ?

4. Image   ?

5. Image   ?

6. Image   ?

7. Image   ?
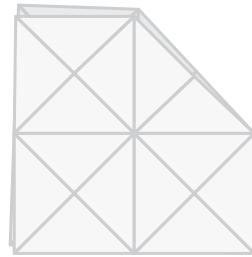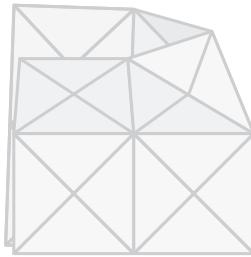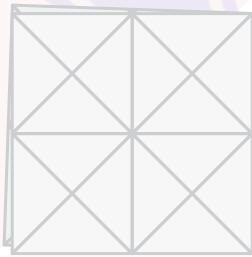
18.1-7 Paper Folding (? Points)

Example by JinHoo Ahn (GMPuzzles.com)

Perform a series of folds on some of the papers to create separate pieces which can be arranged to make images from the given inventory. Each image has its own point value and your team's score is the total value of the images you have made and presented 'concurrently' by the end of round. Folds can only be made along the grid lines. Folded pieces cannot overlap one another. Complete the images exactly as they are given, without any gaps.

In addition to basic folding operations, papers can be folded to create two or more crease lines at once. This is permissible, provided that after every operation the paper is flattened cleanly and all creases are on grid lines. Papers cannot be torn or crumpled. The following is one such 'valid' fold, among others.
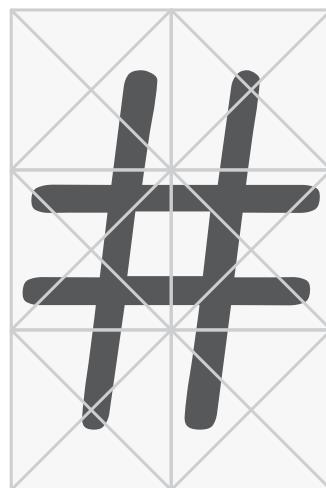

No additional papers will be provided, so teams should be mindful not to damage theirs.

Leave your chosen images at the table, folded and assembled correctly, to be checked and scored by judges. Any images not presented correctly at this stage are not eligible for scoring.
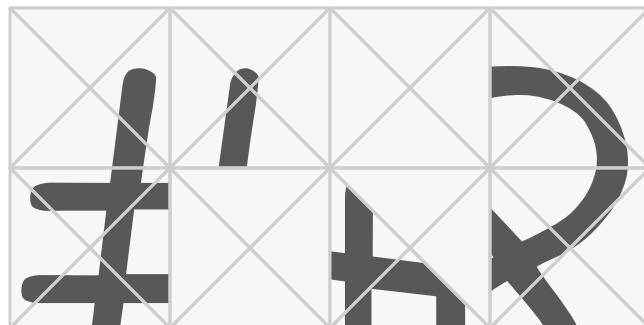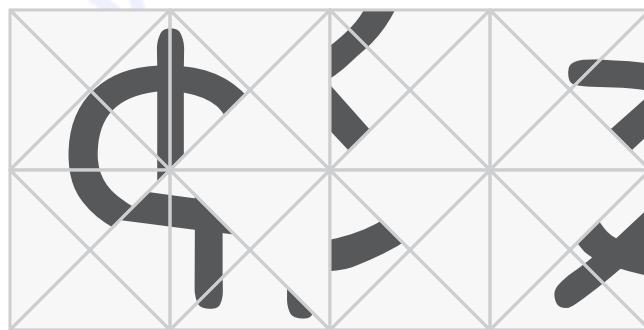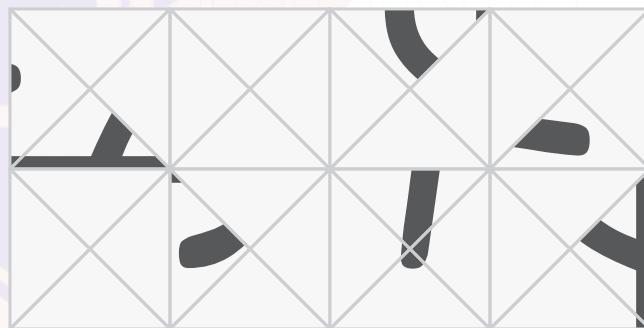
The following example illustrates how subsets of four papers can make three images. The reverse of each paper is given next to it. Cut and fold to simulate the double-sided print.

Steps to make the first image are given, followed by the folding maps of the remaining two images. In this example, it is not possible to make and present two or more images concurrently. Therefore, it would be best to present the highest valued image.
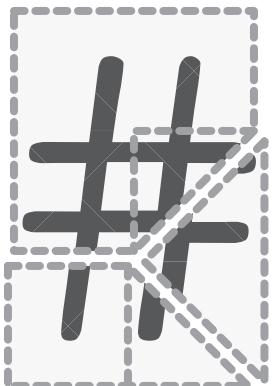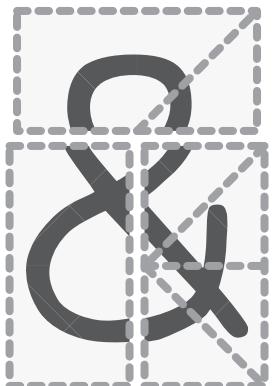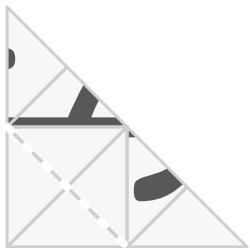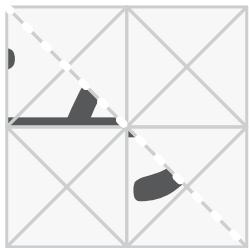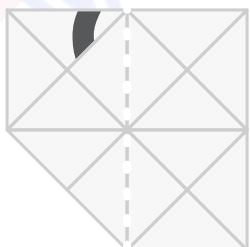
Papers

Steps to make the first image are given, followed by the folding maps of the remaining two images. In this example, it is not possible to make and present two or more images concurrently.
Therefore, it would be wise to present the highest valued image.
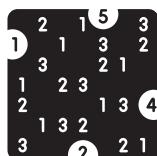
23. GENRE-SPECIFIC MINI-PLAYOFFS

1. TomTom

2. Cross Sums

3. Skyscrapers (Gap)
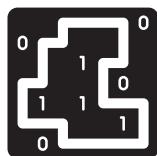
1. Star Battle

2. Battleships

3. Statue Park
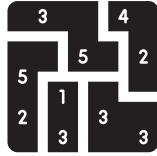
1. Aqre

2. Tapa

3. LITS

1. Castle Wall

2. Slitherlink

3. Cross Border Parity Loop

1. Cave

2. Araf

3. Pentominous
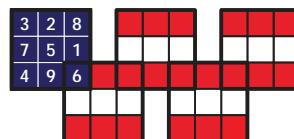
GRANDMASTER PUZZLES

www.GMPUZZLES.com
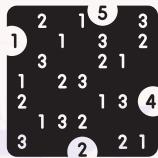
TEAM **USA**

Number Placement Playoff

1. TomTom (1.1)

Insert a number from 1 to N into each cell in the N by N grid so that no number repeats in any row or column. Also, the number in the upper-left corner of each bold cage indicates the value of a mathematical operation (addition, subtraction, multiplication, division) applied successively to all numbers in the cage, starting with the largest number for subtraction and division (e.g. 1,2,4 with subtraction is a 1- clue as 4-2-1 = 1).
The operation may or may not be given in the cage, but at least one of the four operations must apply. Numbers can repeat within a cage.

2. Cross Sums (2.1)

Enter a single digit from 1 to 9 into each white cell so that the sum of digits in each Across entry equals the value given to the left of the entry, and the sum of digits in each Down entry equals the value given above the entry. No digit may be repeated within a single entry (i.e., group of cells connected horizontally or vertically without any black cells between).

3. Skyscrapers (Gap) (3.1)

Insert numbers into some cells of the grid so that each row and column of the grid contains the numbers from 1 to 5 once each and one gap. Each number in the grid represents the height of a building and each clue outside the grid indicates how many buildings can be "seen" while looking from that direction. Taller buildings block the view of smaller buildings. Some rocks may already be given and rocks do not block the view of any building.

Object Placement Playoff

1. Star Battle (5.1)

Fill some cells with stars so that each row, column, and bold region contains the indicated number of stars. Stars cannot be placed in adjacent cells that share an edge or corner.

2. Battleships (6.1)

Locate the indicated fleet in the grid. Each segment of a ship occupies a single cell. Ships can be rotated. Different ships cannot be placed in adjacent cells that share an edge or corner. Some ship segments, or sea cells without any ship segments, are given in the grid. The numbers on the right and bottom edges of the grid reveal the number of ship segments in that row or column.

3. Statue Park (6.5)

A bank of shapes is given with the grid. Place each of the shapes exactly once into the grid, with rotations and reflections allowed. No two shapes can overlap or be orthogonally adjacent, and all of the space not occupied by shapes must be connected. Black circles in the grid represent spaces that must be contained in one of the shapes, and white circles represent spaces that may not be contained in a shape.

Shading Playoff

1. Aqre (11.1)

Shade some cells so that all shaded cells form one connected group. Regions with numbers must contain the indicated count of shaded cells, and it is allowed to shade over the numbered cells. There may not exist a run of four or more consecutive shaded or unshaded cells horizontally or vertically anywhere in the grid.

2. Tapa (12.2)
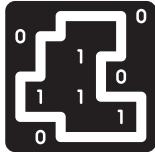
Shade some empty cells black to create a single connected wall. Numbers in a cell indicate the length of consecutive shaded blocks in the neighboring cells. If there is more than one number in a cell, then there must be at least one white (unshaded) cell between the black cell groups. Cells with numbers cannot be shaded, and the shaded cells cannot form a 2×2 square anywhere in the grid.

3. LITS (12.4)

Shade exactly four connected cells in each outlined region, to form an L, I, T, or S tetromino, so that the following conditions are true: (1) All shaded cells are connected with each other; (2) No 2×2 group of cells can be entirely shaded black; (3) When two tetrominoes in adjacent regions share an edge, they must not be of the same type (L, I, T, or S), regardless of rotations or reflections.

Loop/Path Playoff

1. Castle Wall (14.1)

Draw a single closed loop (without intersections or crossings) passing through some empty cells in the grid. The grid contains some bordered or colored cells that cannot be part of the loop. Black cells must be outside the loop; white cells (with heavy borders) must be inside the loop. Numbers and arrows refer to the total sum of the lengths of loop segments in the given direction. (An equivalent way to understand these values is to count the number of cell borders crossed by the loop in that direction.)

2. Slitherlink (15.6)

Locate the indicated fleet in the grid. Each segment of a ship occupies a single cell. Ships can be rotated. Different ships cannot be placed in adjacent cells that share an edge or corner. Some ship segments, or sea cells without any ship segments, are given in the grid. The numbers on the right and bottom edges of the grid reveal the number of ship segments in that row or column.
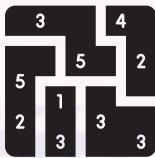
3. Cross Border Parity Loop (16.7)

Draw a single, non-intersecting loop that has two states, which are white and black. The puzzle grid has heavily shaded borders, which define areas in the grid. Whenever the loop crosses a border (including borders inside an area), it changes state from white to black or from black to white. A black circled clue provides the number of cells in each area that the loop traverses in the black state, and a white circled clue provides the number of cells in each area that the loop traverses in the white state. Each "?" represents an unknown integer, zero or larger.

Region Division Playoff
1. Cave (18.1)

Shade some cells to leave behind a single connected group — the cave — with no enclosed, shaded cells. In other words, all shaded cells must be connected by other shaded cells to an edge of the grid. All numbered cells must be a part of the cave, with each number indicating the total count of cells connected vertically and horizontally to the numbered cell **including the cell itself**.

2. Araf (19.2)

Divide the grid into some regions formed of edge-adjacent squares. Each cell is part of one region, and each region should contain exactly two given numbers. Each region must have an area that is strictly between those numbers. (This means, for two number clues A and B with A < B, the area C fulfills A < C < B.)

3. Pentominous (20.0)

Divide the grid into pentominoes (five-cell regions) so that no two pentominoes of the same shape (including rotations/reflections) share an edge. A cell with a letter in it must be part of the pentomino shape normally associated with that letter. An inventory of pentominoes is given below the puzzle but not all shapes must be used.

Note: There is no need to have letters in your solution, only markings so that the regions of the pentominoes are all clear.