

## MLAG BASIC ON-SETS® Tournament Rules 2017-18

### I. Starting a Match (Round)

**A.** Two- or three-player matches will be played. A *match* is composed of one or more shakes. A *shake* begins with the rolling of the cubes, the dealing of some cards, and the setting of a number as the Goal for that shake. A shake ends with at least one player attempting to write a *Solution* consisting of a Set-Name that correctly uses the cubes on the playing mat and describes a set containing the number of cards specified by the Goal.

**B.** The following equipment is needed to play the game:

1. 16 cards: each card contains a unique combination of zero to four dots colored blue (B), red (R), green (G), or yellow (Y). No card contains more than one dot of any color. At the start of a shake, some of these cards are dealt face up to form the *Universe* for that shake.

*Comment* Players should make sure all 16 cards are in the game, with no duplicates. One of the cards is blank.

2. 18 cubes: these consist of the following:

- a. 3 digit cubes: each face has one of the digits 1 through 5.

*Comment* The digit cubes are used only in setting the Goal.

- b. 8 color cubes: each face has a dot colored B, R, G, or Y. Each dot names the set of all cards in the Universe that contain a dot of that same color.

- c. 4 operation cubes: each face has one of the symbols  $\cup$ ,  $\cap$ ,  $-$ , or  $'$ .

- (i)  $\cup$  means the *union* of two sets.

*Example*  $B \cup G$  is the set of cards in the Universe that are *either* B or G.

- (ii)  $\cap$  means the *intersection* of two sets.

*Example*  $R \cap Y$  is the set of cards that are *both* R and Y.

- (iii)  $-$  means set *subtraction*.

*Example*  $B - Y$  is the set of cards that are B *but not* Y.

- (iv)  $'$  means the *complement* of a set.

*Example*  $G'$  (often read "green prime") is the set of cards that are *not* G.

- d. 3 restriction cubes: each face has one of the symbols  $\forall$ ,  $\wedge$ ,  $=$ , or  $\underline{C}$ .

- (i)  $\forall$  names the set of all the cards in the Universe for the shake.

- (ii)  $\wedge$  names the set of no cards (the null or empty set).

- (iii)  $=$  and  $\underline{C}$  are wild cubes.  $=$  can be used in a Solution to represent any of the sets (B, R, G, Y,  $\forall$  or  $\wedge$ ).  $\underline{C}$  can be used to represent any of the operations ( $\cup$ ,  $\cap$ ,  $-$ , or  $'$ ). If multiple  $=$  or  $\underline{C}$  cubes are rolled, each wild symbol must stand for the same set or operation (as applicable) each time it is used in the Solution.

3. A playing mat: this contains four sections.

- a. Goal: digit cubes played here form the Goal.

- b. Required: all cubes played here *must* be used in any Solution.

- c. Permitted: any or all cubes played here *may* be used in any Solution.

- d. Forbidden: *no* cube played here may be used in any Solution.

*Comment* Many game boards have a section labeled "Resources." However, any reference in these rules to the "playing mat" or the "mat" does not include the Resources section.

4. A one-minute sand timer: this is used to enforce time limits.

5. A challenge block: this is a cube or similar object, not a flat object such as a coin. It should not be so large that two players can grab it at the same time.

C. Players may use only pencils or pens and blank paper. No prepared notes, books, tables, calculators, cell phones or other electronic devices may be used, except that players' paper may contain preprinted Universe charts on which the cards that are dealt may be marked.

*Comment* The chart a player uses may not have sets pre-shaded or pre-marked in any way. (See Appendix B for samples.)

D. The Goal-setter for the first shake is determined by lot. On each subsequent shake, the Goal-setter is the player immediately to the *left* of the previous Goal-setter.

To determine the first Goal-setter, each player rolls a digit cube. The player rolling the highest digit sets the first Goal. Players tied for high digit roll again until the tie is broken.

## II. Starting a Shake

A. To begin a shake, the Goal-setter rolls all 18 cubes. The symbols on the top faces of the rolled cubes form the *Resources* for the shake.

1. A shake begins as soon as the timing for rolling the cubes and dealing the cards is started or the cubes are rolled or the first card is dealt.

2. During a shake, no player may turn over a cube or obstruct the other players' view of any cube. (See Section IX-C.)

B. While the Goal-setter rolls the cubes, the player to the *right* of the Goal-setter shuffles and deals the cards.

1. At least six but no more than 12 cards must be dealt.

2. The dealer may not take back a card that has been dealt unless the number of cards exceeds the maximum allowed. In that case, the extra card(s) must be removed from the Universe.

## III. Setting the Goal

A. The player who rolls the cubes must set a Goal by transferring the cube(s) of the Goal from Resources to the Goal section of the playing mat.

B. A Goal consists of at least one and at most three digit cubes that form an expression that names a whole number.


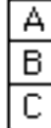


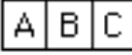


1. If more than one cube is used to set the Goal, the way the cubes are placed in the Goal determines the Goal's value.

a. The sum of two numbers is indicated by placing the cubes in a horizontal line (side by side).

b. The product of two numbers is indicated by placing the cubes in a vertical line.

c. The negative of a number is indicated by placing the cube so that its numeral is upside-down.

The following are the only legal configurations of the cubes for the Goal. Any other configuration is incorrect and a player should challenge Impossible.

Goal	Meaning	Goal	Meaning
	A		$A \times B \times C$
	$A + B$		$(A \times B) + C$
	$A + B + C$		$A \times (B + C)$ or $(A \times B) + (A \times C)$
	$A \times B$		

*Comment* Any digit cubes not used in the Goal must be placed in Forbidden, since they are not used in Solutions.

2. Once a digit cube touches the Goal section of the mat, it must be used in the Goal.
  - a. The Goal-setter indicates the Goal has been set by saying "Goal."
  - b. The Goal-setter may rearrange or regroup the cubes in the Goal section until she says "Goal."
  - c. If the time runs out to set the Goal or the setter turns the timer, it has been set.
  - d. The Goal may not be changed once it has been set.
- C. Before moving the first digit cube to the Goal section of the mat, the Goal-setter may make a *bonus move*.
  1. To make a bonus move, the Goal-setter must say "Bonus," then move one non-digit cube from Resources to Forbidden, and then set the Goal.
- D. If the Goal-setter believes no Goal can be set that has at least one correct Solution (see Section VII), he may declare "No Goal." Opponents have one minute to agree or disagree with this declaration.
  1. If all players agree, that shake is void and the same player repeats as Goal-setter for a new shake.

*Comments*

- (a) The Goal-setter would declare "No Goal" only in those rare instances when an unusual set of Resources was rolled. For example, there are three 1's, the operations are all U signs, and each color appears on at least four cards.
- (b) Players receive no points for the void shake.
2. An opponent who does not agree with the "No Goal" declaration indicates disagreement by picking up the challenge block (see Section V-B) and challenging the "No Goal" declaration. She then has two minutes to write a legal Goal and a correct Solution. If there is a third player, he also can choose to write a legal Goal and a correct Solution.

*Note* The Challenger (and third party, if he agrees) can use as many cubes from Resources as needed. See Section X for scoring.

#### IV. Moving Cubes

- A. After the Goal has been set, play goes in a clockwise direction (to the left).
- B. When it is your turn to play, you must either move a cube from Resources to one of the three sections of the playing mat (Required, Permitted, Forbidden) or challenge the last Mover.

The move of a cube is completed when it touches the mat. Once a cube is legally moved to the mat, it stays in the section where it was played for the duration of the shake.

- C. Any player may make a bonus move before making a regular move. To make a bonus move, the Mover must say “Bonus,” then move one cube from Resources to Forbidden, and then move another cube to Forbidden, Permitted or Required.

*Comments*

- (a) If you do not say ‘Bonus’ before moving the first cube to Forbidden, the move does not count as a bonus move but as a regular move to Forbidden. You are not entitled to play a second cube.
- (b) When making a bonus move, the first cube *must* go to Forbidden. The second (bonus) cube may be moved to Required, Permitted, or Forbidden.

## V. Challenging

- A. Whether or not it is your turn, you may challenge another player who has just completed a move or set the Goal. The two main challenges are Now and Impossible.

*Note* Players may also challenge a “No Goal” call, see Section III-D-2.

- 1. By challenging *Impossible*, a player claims that no correct Solution can be written regardless of how the cubes remaining in Resources may be played.

*Comments*

- (a) If the Goal is not in a legal configuration (see Section III-B-1) or the Goal equals a negative number, an opponent should challenge Impossible.
- (b) A Player who challenges “Never” will be considered to have challenged “Impossible”. There will be no penalty for saying “Never” instead of “Impossible”.

- 2. By challenging *Now*, a player claims that a correct Solution can be written using the cubes on the mat and, if needed, *one* cube from Resources. A player may challenge Now if all of the cubes of her Solution are in Required or Permitted.

- a. A player may challenge Now only if there are at least two cubes in Resources.

If a player challenges Now with fewer than two cubes in Resources, the challenge is invalid and is set aside. (See Sections VIII and IX below.)

*Comment* If only one cube remains in Resources and no one challenges Impossible, then a Solution is possible using that one cube. Since the latest Mover had no choice but to play the second-to-last Resource cube to the mat, it is not fair that he be subject to a Now challenge. (However, an Impossible challenge could be made.) See Section VIII for the procedure to be followed when one cube remains in Resources.

- b. Since a correct Solution must contain at least two cubes, it is illegal to challenge Now after the Goal has been set but before a cube has been played to Required or Permitted.

If a player does so, the challenge is set aside and play continues.

- B. A challenge block is placed equidistant from all players. To challenge, a player must pick up the block and say “Now” or “Impossible.”

A player who picks up the block and makes a challenge against himself is not penalized and the

challenge is set aside.

*Comments*

- (a) The purpose of the block is to determine who the Challenger is in a shake.
- (b) Touching the challenge block has no significance. However, players may not keep a hand, finger, or pencil on, over, or near the block for an extended period of time. (See Section IX-C.)
- (c) A player must not pick up the challenge block for any reason except to challenge. For example, don't pick it up to say "Goal" or to charge illegal procedure or when fewer than two cubes remain in Resources.

## VI. The Solution

A Solution consists of a legal Set-Name that specifies a set of cards in the Universe and does not contain any symbol or group of symbols that is undefined in On-Sets.

*Examples of Solutions*       $R', G U Y, (R \cap B) - \Lambda, (V - G)' U R$

*Comments*

- (a) A Solution written on paper may contain pairs of grouping symbols such as parentheses, brackets or braces even though these do not appear on the cubes. These symbols indicate how the Solution-writer would physically group the cubes if the Solution were built with the cubes.
- (b) **The Solution-writer must not write "= Goal" after the Solution. Doing so makes the Solution incorrect.**
- (c) If the Solution uses an = or C cube as a wild cube, the writer must indicate what the wild cube is used for in writing.

## VII. Writing and Checking Solutions

**A.** After a valid challenge, at least one player must write a Solution.

- 1. After a Now challenge, the Challenger must write a Solution. (The Mover may not present a Solution.)
- 2. After an Impossible challenge, the Mover must write a Solution. (The Challenger may not present a Solution.)
- 3. After a challenge in a three-player match (and before any Solution is presented), the Third Party must indicate **by the end of the two minutes for writing Solutions** whether she is presenting a Solution. The Third Party may not retract her decision once she has indicated whether or not she will present a Solution.

*Comment* To indicate his intention on the challenge, the Third Party may:

- (a) state whether or not he will present a Solution;
- (b) indicate which party, Mover or Challenger, the Third Party is "joining" (agreeing with) on the challenge. This can be done verbally or by pointing to the party.
- (c) present or not present a Solution when the time limit for writing Solutions expires. If the Third Party does not present a Solution, she is assumed to be joining the player who is not writing a Solution (Challenger on an Impossible or Mover on a Now).

**B.** To be *correct*, a Solution must satisfy the following criteria:

- 1. The Solution equals the Goal. That is, the number of cards selected from the Universe equals the Goal.

*Comment*

**Unlike Equations, the Solution-writer must *not* write "= Goal" after the Solution.**

- 2. The Solution uses the cubes correctly.
  - a. The Solution contains at least *two* cubes.
  - b. The Solution uses *all* the cubes in Required.
  - c. The Solution may use one or more cubes in Permitted.
  - d. The Solution uses *no* cube in Forbidden.

*Comment* Since several Resource cubes may show the same symbol, it is possible to have a U in Forbidden that *must not* be used in the Solution at the same time that there is a U in Required that *must* be used.

- e. After a Now challenge, the Solution must contain *at most one* cube from Resources. This means a Solution must need one more (or zero more) cube from Resources.
  - f. After an Impossible challenge, any cubes in Resources are considered to be in Permitted and therefore may be used in the Solution.
3. Every legal interpretation of the Solution equals the Goal.
- a. An *ambiguous Solution* is one that has more than one legal interpretation. Such a Solution is incorrect if an opponent shows that one of the interpretations does not equal the Goal.
  - b. The only defined order of operations in On-Sets is that the ' operation takes priority over all other operations ( $\cup$ ,  $\cap$ , and  $-$ ). Consequently, a Solution may be ambiguous if the writer does not use parentheses (or other symbols of grouping such as brackets or braces) to indicate the order of operations. ' is a unary operation; therefore, a player may not insert a parenthesis to split a ' from a Set-Name.
- C. After the time for writing Solutions has expired (or when all Solution-writers are ready), each Solution that is presented must be checked for correctness.
1. All Solutions must be presented before any is checked.
    - a. Once a player presents a Solution to the opponent(s), she may make no further corrections or additions even if the time for writing Solutions has not expired.
    - b. Each Solution-writer should indicate the Solution to be checked. A writer who forgets to indicate the Solution must do so when asked.
  2. Opponents have two minutes to check each Solution. When more than one Solution must be checked, they may be checked in any order. In a three-player match, *both* opponents must check a player's Solution during the *same* two minutes. No other Solution should be checked during this time.

*Comments*

- (a) When both players in a two-way match present Solutions after the last cube has been moved (see Section VIII below), only one Solution should be checked at a time.
  - (b) Players must not physically move the cubes in Required, Permitted, and Resources to form the Solution being checked. This causes arguments over where each cube was played.
3. Within the time for checking a Solution, opponents must accept or reject the Solution. A player who claims an opponent's Solution is not correct must show that it violates at least one of the criteria in Section VII-B or cite one of the reasons below. A Solution is correct if no opponent shows that it is incorrect.
- a. The Goal has no legal interpretation.

*Examples*

- (a) The Goal is in the shape of a backwards L, which is not a legal configuration.
  - (b) The Goal equals a negative number.
- b. The Solution equals a value that is not the value of the Goal.
- (i) Checkers must *make an effort* to determine whether the Solution equals the Goal before rejecting the Solution. This can usually be done by applying the Solution to the Universe and turning over cards and/or selecting out the cards that are included in the Solution.
  - (ii) The checker can give a general argument that the Solution does not

equal the Goal.

*Example:* The Goal is 0, and the Solution clearly does not give the null set.

(iii) One or both of the checkers may ask a judge to determine whether the Solution equals the Goal. However, the checkers will be restricted in that **No further objections to the Solution will be allowed** even if the time limit for checking has not expired. If there are two checkers, both must agree that there are no other questions (cubes on the mat, parentheses, procedures, etc.), as this is the final question that a judge will answer.

c. The Solution may be grouped so that it does not equal the value of the Goal. If an opponent believes there is an interpretation of a Solution that does not equal the Goal, that opponent must copy the Solution onto his own paper and add symbols of grouping to create a *wrong* interpretation. If this revised Solution does not equal the Goal, the Solution is incorrect. However, each checker has only *one* opportunity to prove ambiguity.

*Examples*

(a) The Solution B U G – R is ambiguous and may be interpreted by an opponent as (B U G) – R or as B U (G – R). If the interpretation the opponent selects does not equal the Goal, the Solution is incorrect.

(b) R U G' is *not* ambiguous. It must be interpreted as R U (G') since ' takes priority over U.

*Comment* The = and C cubes are wild and may stand for any set or operation, respectively; but each must stand for the same thing wherever it is used. A Solution-writer must indicate clearly and unambiguously in writing what each wild cube represents.

d. A symbol or group of symbols in the Solution has no defined meaning.

*Examples:* R U 'B or R Δ G.

## VIII. Last Cube Procedure

A. If one cube remains in Resources, the next Mover must either play that cube to Required or Permitted or challenge Impossible. When the cube has been moved, each player has two minutes to write a Solution.

The last cube in Resources may *not* be moved to Forbidden. If a player does so, any challenge that is made is set aside and the cube is returned to Resources. There is no penalty unless the player's time to move expires. (See Section XI.)

B. An opponent may challenge Impossible against the player who moved the last cube from Resources to Required or Permitted, provided the challenge is made by the end of the first minute for writing Solutions. If the challenge is made, the Mover (and the Third Party if siding with the Mover) has the rest of the original two minutes to write a Solution.

*Comment* Any Now challenge with one cube or zero cubes left in Resources is invalid, as is any Impossible challenge made after the first minute for writing Solutions. In both cases, the challenge is set aside and there is no point penalty.

## IX. Illegal Procedures

A. Any action that violates a procedural rule is an *illegal procedure*. A player charging illegal procedure must specify clearly (within 15 seconds) the exact nature of the illegal procedure.

1. If a move *is* an illegal procedure, the Mover must return any illegally moved cube(s) to their previous position(s) (usually Resources) and, if necessary, make another move.

The Mover must be given at least 10 seconds to make this correction, unless the original move was made after the 10-second countdown (see Section XI-A-3 below), in which case the time-

limit rule (Section **XI-A**) is enforced. In general, there is no direct penalty except that the Mover may lose a point if she does not legally complete her turn during the time limit.

*Examples of illegal procedures*

Moving out of turn, moving two cubes without calling “Bonus” before the first cube touches the mat in Forbidden, or moving the last cube in Resources to Forbidden.

2. If the move is *not* an illegal procedure, the cube stands as played.

*Comment* There is no penalty for erroneously charging illegal procedure. However, see Section **IX-C** below if a player does so frequently.

- B.** An illegal procedure is *insulated* by a legal action (for example, a move or challenge) by another player so that, if the illegal procedure is not corrected before another player takes a legitimate action, it stands as completed.

*Example* Suppose a player makes an invalid bonus move (such as moving two cubes to Required). Before anyone notices the illegal procedure, the next mover moves (or a valid challenge is issued). Then the illegal bonus move stays without penalty.

- C.** Certain forms of behavior interfere with play and annoy or intimidate opponents. If a player is guilty of such conduct, a judge will warn the player to discontinue the offensive behavior. Thereafter during that round or subsequent rounds, if the player again behaves in an offensive manner, the head judge may penalize the player one point for each violation after the warning. Flagrant misconduct or continued misbehavior may cause the player’s disqualification for that round or all subsequent rounds. The head judge may even decide to have the other two opponents replay one or more shakes or the entire round because play was so disrupted by the third party. In some cases, the head judge may order the shake replayed by all three players.

*Examples* This rule applies to use of a cell phone, constant talking, tapping on the table, humming or singing, loud or rude language, keeping a hand or finger over or next to the challenge block, making numerous false accusations of illegal procedure, and so on. It also includes not playing to win but rather trying only to ruin the perfect scores of one or both opponents (for example, by erroneously challenging Now or Impossible at or near the beginning of each shake so that both opponents will score 5 for the round), counting down the 10-second warning in an obnoxious manner, etc.

## **X.** Scoring a Shake

- A.** After a challenge, a player is *correct* according to the following criteria:

1. That player had to write a Solution and did so correctly.

If the Third Party agrees with the person who must write a Solution, the Third Party must write a correct Solution also.

2. That player did not have to write a Solution (someone else did), and no opponent wrote a correct Solution.

Exception: After an Impossible Challenge in a three-player match, a player who does not present a Solution for a shake scores 2 if he accepts another player’s Solution as correct even if that Solution is subsequently proven wrong by the other checker.

- B.** After a challenge, points are awarded as follows:

1. Any player who is not correct scores 2.
2. Any player who is correct scores 6, unless that player is the Third Party agreeing with the Challenger, in which case the score is 4.

- C.** After the last cube from Resources is moved to the playing mat and no one challenges Impossible, points are awarded as follows:

1. Any player who writes a correct Solution scores 4.
2. Any player who does not write a correct Solution scores 2.



D. A player who is absent for a shake scores 0 for that shake.

## XI. Time Limits

A. Each task a player must complete has a specific time limit (listed below). The one- and two-minute time limits are enforced with the timer. If a player fails to meet a deadline, he loses one point and has one more minute to complete the task. If he is not finished at the end of this additional minute, he loses his turn or is not allowed to complete the task.

*Note* In Minor, Elementary and Middle Divisions, each one-point penalty must be approved by a judge initialing the scoresheet.

1. The time limits are as follows:

- |   |            |
|---|------------|
| a. setting the Universe   | 1 minute   |
| b. rolling the cubes and setting the Goal   | 2 minutes  |
| c. first turn of the player to the left of the Goal-setter  | 2 minutes  |
| d. all other regular turns (including any bonus moves)  | 1 minute   |
| e. stating a valid challenge after picking up the challenge block   | 15 seconds |
| f. deciding whether to challenge Impossible when no more cubes remain in Resources  | 1 minute   |
| If an Impossible challenge is made, any time (up to a minute) that the Challenger took deciding to challenge counts as part of the two minutes for writing a Solution.                            |            |
| g. writing a Solution   | 2 minutes  |
| During this time, the Third Party (if there is one) must decide whether to present a Solution after a Now or Impossible challenge. At the end of these two minutes she must present her solution. |            |
| h. deciding whether an opponent's Solution is correct   | 2 minutes  |

2. Often a player completes a task before the time limit expires. When sand remains in the timer from the previous time limit, the next player will receive additional time. An opponent timing the next player may either flip or not flip the timer so as to give the opponent the lesser amount of time before the remaining sand runs out and the next time limit can be started.
3. A player who does not complete a task before all the sand runs out for the time limit must be warned that time is up. An opponent must then count down 10 seconds loud enough for the opponent to hear. The one-point penalty for exceeding a time limit can be imposed only if the player does not complete the required task by the end of the countdown.

The countdown must be done at a reasonable pace; for example, "1,010; 1,009; 1,008..."

B. A round lasts a specified amount of time (usually 30 minutes). When that time is up, players are told not to start any more shakes.

Players have five minutes to finish the last shake. After these five minutes, players still involved in a shake in which no challenge has been made and one or more cubes remain in Resources will be told: "Stop, don't move another cube — this is the end of the round. Each player has two minutes to write a correct Solution that may use any of the cubes remaining in Resources. Any player who presents a correct Solution scores 4 points for the shake; an incorrect Solution scores 2."

## XII. Scoring a Match

- A. Each player is awarded points for the match based on the sum of his scores for the shakes played during that match according to the following tables:

Three-Player Matches	Points
first place	6
two-way tie for first	5
three-way tie for first	4
second place	4
tie for second	3
third place	2

Two-Player Matches	Points
first place	6
two-way tie for first	5
second place	4

- B. When a round ends, each player must sign (or initial) the scoresheet and the winner (or one of those tied for first) turns it in. If a player signs or initials a scoresheet on which his score is listed incorrectly and the error was a simple oversight, then, with the agreement of all players, correct the scores.

However, if there is evidence that there was intent to deceive and the error was not a simple oversight, then do the following:

1. If the error gives the player a lower score, he receives the lower score.
2. If the error gives the player a higher score, he receives 0 for that round.