

MLAG BASIC EQUATIONS[®] Tournament Rules 2018-19

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* consists of a roll of the cubes and the play of the game ending with at least one player attempting to write an *Equation* that contains a mathematical expression that equals the Goal and correctly uses the cubes on the playing mat.

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

1. 24 cubes: there are six of each color (red, blue, green, and black). Every face of each cube contains either a digit (0, 1, 2, 3, 4, 5, 6, 7, 8, 9) or an operation sign (+, −, ×, ÷, * or ^, √).
2. A playing mat: this contains four sections:
 - a. Goal: 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 “mat” does not include the Resources section.

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

4. 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.

In Minor, Elementary and Middle Divisions, players may use a preprinted chart for recording the Resources, Goal and Solutions.

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 red cube. The player rolling the highest digit sets the first Goal. A player who rolls an operation sign is eliminated unless all players roll an operation sign. Players tied for high digit roll again until the tie is broken.

II. Starting a Shake

To begin a shake, the Goal-setter rolls all 24 cubes. The symbols on the top faces of the rolled cubes form the *Resources* for the shake.

(a) A shake begins as soon as the timing for rolling the cubes is started or the cubes are rolled.

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

III. Legal Mathematical Expressions

A. A *legal mathematical expression* is one that names a real number and does not contain any symbol or group of symbols that is undefined in Equations.

Example $a \div 0$ for any value of a does not name a real number. (See Section C below for additional examples.)

Comment An expression 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 Equation-writer would physically group the cubes if the Solution were actually built with the cubes.

B. The symbols on the cubes have their usual mathematical meanings with the following exceptions:

1. The + and − cubes may be used only for the operations of addition and subtraction;

they may not be used as positive or negative signs.

Examples $+7$, -8 , $6x+4$, and $17 \div (-8)$ are illegal expressions.

2. If the radical sign ($\sqrt{\quad}$) is used, it must always be preceded by an expression to denote its index unless the index equals 2. If no index is shown, it is understood to be 2.

Examples $2\sqrt{9}$ or just $\sqrt{9}$ is legal and means “the square root of 9”; $1\sqrt{2}$ means “the first root of 2,” which is 2. $(2+1)\sqrt[3]{8}$ means “the cube root of 8,” which is 2. $4x\sqrt{9}$ means “4 times the square root of 9,” which is 4×3 or 12. $3\sqrt{\sqrt{9}}$ means “the cube root of the square root of 9,” which is the sixth root of 9. (This expression is illegal in Elementary Division – see the “General Rule” in Section III-C-3.)

3. $*$ (or \wedge) means exponentiation (raising to a power). The \wedge cube must be written with the point up.

Example $4*2$ (or $4\wedge 2$) means 4^2 , which is $4 \times 4 = 16$.

C. Expressions involving powers and roots must satisfy these requirements:

1. Even-indexed radical expressions indicate only *non-negative* roots.

Examples $\sqrt{9}$ equals 3, not -3 ; $4\sqrt{16} = 2$ (not -2).

2. The following expressions are *undefined*.

Note In all cases, $*$ may be replaced by \wedge .

a. $0\sqrt{a}$ where a is any number

b. $0 * a$ where $a \leq 0$

c. $a \sqrt{b}$ where a is an even integer and b is negative

d. $(a \div b) \sqrt{c}$ where c is negative and, when $a \div b$ is reduced to lowest terms, a is an even integer and b is an odd integer

e. $a * (b \div c)$ where a is negative and, when $b \div c$ is reduced to lowest terms, b is an odd integer and c is an even integer

Examples

(a) $(-8)^{4/6}$ is defined, as shown by the following steps. First reduce the fractional exponent to lowest terms: $(-8)^{4/6} = (-8)^{2/3}$. $(-8)^{2/3}$ is of the form $a * (b \div c)$ where a is negative. Since b is even and c is odd, $(-8)^{2/3}$ is defined. $(-8)^{2/3} = 3\sqrt{(-8)^2} = 3\sqrt{64} = 4$.

(b) $(-4)^{2/4}$ is *not* defined because $(-4)^{2/4} = (-4)^{1/2}$, which is of the form $a * (b \div c)$ with a negative, b odd, and c even.

Note The following reasoning is *not* allowed since the exponent is not reduced first:

$(-4)^{2/4} = 4\sqrt{(-4)^2} = 4\sqrt{16} = 2$.

(c) $3/6\sqrt{(-9)}$ is defined because $3/6\sqrt{(-9)} = 1/2\sqrt{(-9)}$, which is of the form $(a \div b) \sqrt{c}$, with c negative.

However, a is odd and b is even. So $3/6\sqrt{(-9)} = (-9)^{6/3} = (-9)^2 = 81$.

(d) $8/2\sqrt{(-5)}$ is *not* defined because $8/2\sqrt{(-5)} = 4\sqrt{(-5)}$, which is of the form $a \sqrt{b}$ where a is even and b is negative.

3. In the Elementary Division, if $*$ (or \wedge) is used for raising to a power, both base and exponent must be whole numbers. If $\sqrt{\quad}$ is used for the root operation, the index must be a counting number, and the base and total value must be whole numbers.

Examples (in each case, $$ may be replaced by \wedge .)*

(a) $3 * 2$ is acceptable and equals 9. $0 * 9$ equals 0 and $7 * 0$ equals 1. However, $2*(1-3)$, $4*(1\div 2)$, $(2-5)*4$, and $(2\div 3)*3$ are not legal in Elementary.

(b) $2\sqrt{9}$ or just $\sqrt{9}$ is acceptable and equals 3. $9\sqrt{0}$ equals 0. However, $\sqrt{5}$ and $3\sqrt{9}$ are not legal since neither is a whole number. Also $2\sqrt{(1\div 3)}$, $(1\div 2)\sqrt{5}$, and $3\sqrt{(1-9)}$ are illegal in Elementary.

(c) The legality of $\sqrt{3*4}$ depends on its grouping. $\sqrt{(3*4)}$ is legal; $(\sqrt{3})*4$ is not.

Note {counting numbers} = {natural numbers} = {positive integers} = {1, 2, 3, 4, ...};
{whole numbers} = {0, 1, 2, 3, 4, ...}.

IV. 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 six cubes that form a legal expression.
1. Numerals used in the Goal are restricted to one, two or three digits. The use of operation signs is optional. All cubes should be right-side up (not sideways or upside down).

Examples of legal Goals: 6, 23, 8–9, 17×8 , $19 + 8 - 5$, $87 \div 13$, $3\sqrt{64}$, $\sqrt{49}$, 125

Examples of illegal Goals: $23 + 18 + 7$ (too many cubes), $45x$

(does not name a number), $+8$ (does not name a number since $+$ means addition).

2. The order of operations of mathematics applies to the Goal. The Goal-setter may physically group the cubes in the Goal to indicate how it is to be interpreted.

Examples

(a) $2x\ 3+5$ (with space between x and 3) means $2 \times (3 + 5)$.

(b) $2x3 +5$ (with space between 3 and $+$) means $(2 \times 3) + 5$.

Comment The Goal-setter may not be able to remove all ambiguities from the Goal.

Example $\sqrt{5+4}\ x9$ where the Goal-setter wants to apply the $\sqrt{}$ to the entire expression $(5+4) \times 9$.

Declaring orally that the $\sqrt{}$ applies to everything that follows or extending the root over the entire expression in writing is not binding. For the purposes of the game, a root in this type of expression will refer only to the first term (in parentheses) in the expression.

3. Once a cube touches the Goal section, 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 he 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 cube to the Goal section of the mat, the Goal-setter may make a *bonus move*. To make a bonus move, the Goal-setter must say “Bonus,” then move one cube from Resources to Forbidden, and then move one or more cubes to 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 fewer than three digit cubes or only one or two operation cubes.

(b) Players receive no points for the void shake.

(c) If the Goal-setter makes a Bonus move, he is committed to setting a goal and may not declare “No Goal”

2. An opponent who does not agree with the “No Goal” declaration indicates disagreement by picking up the challenge block (see Section VI-B) and challenging the “No Goal” declaration. She then has two minutes to write a correct Equation. If there is a third player, he also can choose to write an Equation. The Challenger and Third Party may use as many cubes from Resources as needed for the Goal and Solution. Scoring for a challenged “No Goal” is as follows:.

- **If the Challenger presents a correct Equation, he scores 6. If the Challenger’s Equation is incorrect, he scores 2.**



- If the Third Party presents an incorrect Equation, she scores 2. If the Third Party presents a correct Equation, she scores 4. If the Third Party does not present an Equation, she scores 6 if the Challenger's Equation is incorrect or 2 if the Challenger's Equation is correct.
- If either the Challenger or the Third Party presents a correct Equation, the original Goal-setter scores 2. If neither the Challenger nor the Third Party presents a correct Equation, the original Goal-setter scores 6.

V. 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.

VI. 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 IV-D-2.

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

Comments

- (a)** If the Goal is not a legal mathematical expression (see Section III), an opponent should challenge Impossible. Examples of such Goals are +8, $65+87-3$, 122, and so on.
- (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 Equation 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 Never, 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.

VII. Writing and Checking Equations

A. After a valid challenge, at least one player must write an Equation.

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

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

- (a) state whether or not he will present an Equation;
- (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 an Equation when the time limit for writing Equations expires. If the Third Party does not present an Equation, she is assumed to be joining the player who is not writing an Equation (Challenger on a Impossible or Mover on a Now).

B. To be correct, a Solution must be a legal mathematical expression (see Section III) that satisfies the following criteria:

1. The Solution must be part of a complete Equation in this form:

$$\text{Solution} = \text{Goal}$$

Comment While $\text{Solution} = \text{Goal}$ is the recommended form for writing the Equation, $\text{Goal} = \text{Solution}$ is acceptable. (See Appendix A for all matters involving how Equations are written.)

2. The Solution must equal the interpretation of the Goal that the Equation-writer presents with the Solution.

*Examples (in each case * may be replaced by ^.)*

Goal	Sample Equation	Goal	Sample Equation
37	$(6 \times 6) + 1 = 37$	11+5	$(3 \times 2) + (5 \times 2) = 11 + 5$
$2 \times 7 + 2$	$(5 * 2) - (4 + 5) = 2 \times 7 + 2$	$3x \ 5 + 2$	$(5 \times 4) + 1 = 3 \times (5 + 2)$

Comments

- (a) An Equation-writer who does not write a complete Equation ($\text{Solution} = \text{Goal}$), even when there is only one interpretation of the Goal, is automatically incorrect.
- (b) The Equation-writer does not write the *value* of the Goal except in those cases where writing the Goal is the same as writing its value.

Examples

- (a) The Goal is 37 or 143.
- (b) For a Goal like $3 \times 5 + 2$, the writer must write $3 \times 5 + 2$ and not 17.
- (c) If the Goal is grouped, as in $3 \times 5 + 2$, an Equation-writer must write $3 \times (5 + 2)$ and not $3 \times \ 5 + 2$ (with space between x and 5 but no parentheses).

3. 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 2 in Forbidden that *must not* be used in the Solution at the same time that there is a 2 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.
4. The Solution contains only one-digit numerals.
 5. In Basic Equations, the general order of operations of mathematics (parentheses first, roots/exponents next, then multiplication/division, finally addition/subtraction, going from left to right) applies to Goals and Solutions. If parentheses do not remove all ambiguity, use order of operations to interpret the value.

C. After the time for writing Equations has expired (or when all Equation-writers are ready), each Equation that is presented must be checked for correctness.

1. All Equations must be presented before any is checked.
 - a. Once a player presents an Equation to the opponent(s), she may make no further corrections or additions even if the time for writing Equations has not expired.
 - b. Each Equation-writer must indicate the Equation to be checked, *including the interpretation of the Goal*. A writer who forgets to indicate the Equation must do so when asked.
2. Opponents have two minutes to check each Equation. When more than one Equation must be checked, they may be checked in any order. In a three-player match, *both* opponents must check a player's Equation during the *same* two minutes. No other Equation should be checked during this time.

Comments

- (a) When both players in a two-way match present Equations after the last cube has been moved (see Section VIII below), only one Equation 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 an Equation, opponents must accept or reject the Equation. A player who claims an opponent's Equation is not correct must give at least one of the following reasons (or cite one of the reasons in Section VII-B). An Equation is correct if no opponent shows that it is incorrect.
 - a. The Solution is NOT in the form *Solution = Goal* (or *Goal = Solution*)
 - b. The Solution DOES NOT equal the interpretation of the Goal that the Equation-writer presents with the Solution.
 - c. The Solution DOES NOT use the cubes correctly.
 - (i) The Solution contains only one cube.
 - (ii) The Solution DOES NOT use *all* the cubes in Required.
 - (iii) The Solution uses a cube in Forbidden.
 - (iv) After a Now challenge, the Solution needs more than *one* cube from Resources.
 - d. The Solution contains numerals with multiple digits.
 - e. The Goal has no legal interpretation.

Examples

- (a) $7 \div 0$
- (b) A Goal containing more than six cubes or a four-digit number
- (c) A Goal with sideways or upside-down symbols on the cubes
- (d) Elem: $3 \sqrt{9}$

f. The Equation-writer's interpretation of the Goal is not a legal interpretation.

Examples

- (a) The writer groups the Goal in an illegal manner:
e.g.: The Goal is grouped on the mat as $5x \ 3+4$ and the writer interprets it as $(5x3)+4$.

g. The Solution does not equal the Equation-writer's interpretation of the Goal.

- (i) Checkers must *make an effort* to determine whether the Solution equals the writer's interpretation of the Goal before rejecting the Equation.
- (ii) The checker can give a general argument that the Solution does not equal the Goal.

Examples

- (a) The Goal is a fraction or an irrational number, but the solution equals an integer (or vice-versa).
- (b) The Solution equals a value greater than 1000 when the Goal is 50×10 . That is, the Solution is clearly too big (or too small) even without calculating its exact value.

(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 Equation 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.

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 an Equation.

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 Equations. 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 an Equation.

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 Equations. 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 ten-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 he does not legally complete his 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, 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). In this case, 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), constantly charging illegal procedure erroneously, 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 an Equation and did so correctly.

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

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

Exception: After an Impossible Challenge in a three-player match, a player who does not present an Equation for a shake scores 2 if he accepts another player’s Equation as correct even if that Equation 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 Equation scores 4.

2. Any player who does not write a correct Equation 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.** rolling the cubes and setting the Goal 2 minutes
- b.** first turn of the player to the left of the Goal-setter 2 minutes
- c.** all other regular turns (including any bonus moves) 1 minute
- d.** stating a valid challenge after picking up the challenge block 15 seconds
- e.** 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 an Equation.

- f.** writing an Equation 2 minutes

During this time, the Third Party (if there is one) must decide whether to present an Equation after a Now or an Impossible challenge. At the end of these two minutes she must present her solution.

- g.** deciding whether an opponent's Equation 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 Equation that may use any of the cubes remaining in Resources. Any player who presents a correct Equation scores 4 points for the shake; an incorrect Equation 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
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, she receives the lower score.
2. If the error gives the player a higher score, she receives 0 for that round.

XIII. High School Basic

For Junior and Senior players, Basic Equations is played with all the rules listed above and the three adventurous variations listed below. Those three variations are in effect for all shakes.

- **Sideways:** A cube representing a non-zero number may be used sideways in the Goal or Solution to equal the reciprocal of that number.

Examples $1 + 2 + \text{sw} = 1 + 2 + 0.5 = 3.5;$

$$1 \div \text{sw} = 1 \div (1/3) = 1 \times 3 = 3$$

Comment See the Adventurous Equations Appendix for ways to indicate a sideways cube in an Equation.

- **Upside-down:** A cube representing a number may be used upside-down in the Goal or Solution to equal the additive inverse of that number.

Examples $6 \times \text{ud} = 6 \times (-2) = -12.$ However, 6ud is *not* legal for $6 - 2$ or $60 + (-2).$

Comment See the Adventurous Equations Appendix for ways to indicate a sideways cube in an Equation.

Note: The Sideways rule and the Upside-down rule may be used on a single-digit numeral at the same time if both variations have been selected, but only in a Solution

Examples $3 = -\frac{1}{3}; \quad 8 = -\frac{1}{8}$

sw

sw

ud

ud

- **0 Wild:** The 0 cube may represent any *symbol* (numeral or operation) on the cubes, but it must represent the same symbol everywhere it occurs (Goal and Solution). Each Equation-writer must specify in writing the interpretation of the 0 cube if it stands for anything other than 0 in the Equation.

Examples

(a) $(0 \times 6) - 0 = 15,$ where both 0's stand for 3, is allowed but $(0 \times 6) - 0 = 14,$ where the first 0 stands for 3 and the second for 4, is *not* allowed.

(b) $(0 \times 6) - 0 = 12,$ where the first 0 stands for 2 and the second for 0, is *not* allowed.

(c) A 0 in the Goal and any 0 in the Solution must equal the same number. So $(8 \times 5) + 0$ equals the Goal 40 if each 0 equals 2. However, $(9 \times 5) - 0,$ where this 0 stands for 5, does *not* equal the Goal 40.

Comments - If a player interprets 0 in the Goal as x, then any 0 in that player's Solution must also be an x.