IJRU Competition Rules

Technical Manual

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Technical Manual

The Technical Manual ™ contains detailed technical specifications of concepts like scoring and results.

Calculating speed and multiples scores

Scores are collected from each judge and averaged according to the averaging rules.

This average is called a

False starts and false switches cause a deduction of 10 clicks for each instance. The final score is the average of the two closest judge scores minus the deductions.

The amount of false starts and false switches as reported by the head judge are summed up and multiplied by ten, this is called m. ($m = (\text{starts} + \text{switches}) \times 10$) The result, called R, is obtained by subtracting the deductions (m) from the average score (a). ($R = a - m$)

Calculating freestyle scores

Freestyle scores are based on a cumulative Difficulty model where Presentation, Required Elements, Deductions, and Repeated Skills can affect the score.

Difficulty is calculated by adding the points from each skill performed. There is no limit on the total difficulty score. Repeated Skills are also calculated in this way and is later deducted from the difficulty score.

Presentation increases or decreases the score by a percentage calculated from the presentation marks (+, , or -).

Deductions take off a percentage for misses, and time and space violations.

Each missed required element will also take off a percentage from the total score.

The result/routine score (called R) is obtained by multiplying the difficulty score (D) subtracted by the repetition score (U) with the presentation score (P), the deduction score (M), and the required elements score (Q). The result cannot be lower than 0.

$$R = (D - U) \times P \times M \times Q$$

The calculation for each of these scores is described in the following sections.

Difficulty

There is no maximum difficulty score. The difficulty score is the sum of the total points for each skill performed in a routine. Every time a skill is successfully performed, the value of that skill is added to the difficulty score.

The points per level can be calculated with the following formulas where x is the level of the skill $L(x) = 0.1 \times 1.5^x$ rounded to two decimal places. However, a level 0 skill is always worth 0 points.

▼ Example

The point values per level 0-8 skill are:

Level	0	0.5	1	2	3	4	5	6	7	8
Points per skill	0.00	0.12	0.15	0.23	0.34	0.51	0.76	1.14	1.71	2.56

The score of every difficulty judge is calculated by multiplying the amount of skills recorded at that level by that judge (called n_x, where x is the level) with $L\left(x\right)$ for each level, and adding the results (called s_x) for each level together, (the resulting sum is called d_j , where j is the judge number. This means judge 1 is called d_1, judge 2 is called d_2, etc.) For example:

$$
\begin{aligned}
s_1 &= L(1) \times n_1 \\
s_2 &= L(2) \times n_2 \\
d_1 &= \sum_{n=1}^{x} = s_1 + s_2 + ... + s_x
\end{aligned}
$$

All difficulty judges' scores are then averaged together according to the averaging rules, the result is called D

▼ Example

A difficulty score will be calculated by multiplying the number of times the athlete(s) completes a skill by the point value of the corresponding skill level. (For example, if an athlete completes 10 level 1 skills, they will get 1.5 points, as $10 \times 0.15 = 1.5$).

Then, the total points for each level are added together to get a total difficulty score for that judge. For example, if an athlete completes 10 level 1 skill, 10 level 2 skills and 10 level 3 skills they will get 7.2 points ($10 \times 0.15 + 10 \times 0.23 + 10 \times 0.34 = 1.5 + 2.3 + 3.4 = 7.2$ points).

Repeated skills

The repeated skill deduction is calculated the same way as the Difficulty score. The result is called U and cannot be bigger than the difficulty score D.

> **TIP**
>
> The Required Element judges score the level of repeated skills, the repeated skill deduction is then calculated in the exact same way as the Difficulty score.

Presentation

The presentation score may impact the difficulty score by a total factor of $F_p = 60\% = 0.60$
Where the Form and Execution category may impact the score by a factor of $F_{p,F} = \frac{1}{2}F_p$,
the Entertainment category may impact the score by a factor of $F_{p,E} = \frac{1}{4}F_p$,
the Musicality category may impact the score by a factor of $F_{p,M} = \frac{1}{4}F_p$

In events where tournament organisers have decided music won't be used the following factors are used

Form and Execution category may impact the score by a factor of $F_{p,F} = \frac{1}{2}F_p$,
the Entertainment category may impact the score by a factor of $F_{p,E} = \frac{1}{2}F_p$,
the Musicality category may impact the score by a factor of $F_{p,M} = 0$

The total presentation score may be outside $1 \pm F_p$

The scores of each category (**F**orm and Execution, **E**ntertainment, **M**usicality) for each judge is calculated on a scale from −3 to 3 as j_F, j_E, j_M by averaging the marks the judge has given in that category where "–" is worth -3, (the amount of negative marks given by a judge for a specific category is called $n_{\mathrm{x,minus}}$ where x is F, E or M, for the category) " " is worth 0 (despite this, the marks are important as they are part of the average and brings the score closer to the average; the amount of checkmarks given by a judge is called $n_{\mathrm{x,check}}$) and "+" is worth 3. (the amount of positive marks given by a judge is called $n_{\mathrm{x,plus}}$)

$$j_x = \frac{-3 \times n_{\mathrm{x,minus}} + 0 \times n_{\mathrm{x,check}} + 3 \times n_{\mathrm{x,plus}}}{n_{\mathrm{x,minus}} + n_{\mathrm{x,check}} + n_{\mathrm{x,plus}}} = \frac{3\left(n_{\mathrm{x,plus}} - n_{\mathrm{x,minus}}\right)}{n_{\mathrm{x,minus}} + n_{\mathrm{x,check}} + n_{\mathrm{x,plus}}}$$

The averages of all judges' scores for each category is then averaged as a_F, a_E and a_M by averaging j_x according to the averaging rules for all judges who judged that category.

To calculate the multiplication factor that will be used to calculate the final score, the averages a_x are multiplied by their respective factor $F_{p,x}$ and added to 1, this is called P.

$$P = 1 + (a_F \times F_{p,F} + a_E \times F_{p,E} + a_M \times F_{p,M})$$

▼ Simplified

The Presentation score will be multiplied by the difficulty score, which can raise or lower the total score. The presentation score can impact the routine in a range of $+180\%$ to -180%. The presentation score is broken down into three categories at weights as follows:

- Form/Execution: 50% of the 180%
- Entertainment: 25% of the 180%
- Musicality: 25% of the 180%

The range of $\pm 180\%$ can in other words be broken down into three ranges of:

- Form/Execution: $\pm 90\%$
- Entertainment: $\pm 45\%$
- Musicality: $\pm 45\%$

To calculate the presentation score, the marks of each judge are given a value, with the check being 0, the minus being the negative value of that category and the plus being the positive value of that category. Within each category, the average mark values for all judges are averaged according to the averaging rules. Then the categories are all added together for the final presentation adjustment value.

Deductions

Each deduction (miss, time violation, space violation) may impact the score with a factor of $F_d = 2.5\% = 0.025$

The average number of misses recorded by the Required Element and Athlete Presentation judges are calculated according to the averaging rules. This average is called a_m and is rounded to a whole number, the factor F_d is then multiplied with a_m, the result is called m. ($m = F_d \times \lfloor a_m \rceil$)

The average number of additional violations (time and space) recorded by the required element judges are calculated and called a_v this average is also rounded to a whole number, the factor F_d is then multiplied with a_v , the result is called v. ($v = F_d \times \lfloor a_v \rceil$)

The misses (m) and violations (v) are summed together and subtracted from 1, the result is called M and cannot be lower than 0. ($M = 1 - (m + v)$)

▼ Simplified

The Required Element judges and Athlete Presentation judges count misses. These are averaged to get the number of misses. Each miss will take 2.5% off the total routine score.

The Required Element judges count some additional deductions which are time and space violations, those are calculated and averaged separately and added to the average amount of misses to determine the final deduction value.

Required elements

Each missed required element may impact the score by a factor of $F_q = F_d = 2.5\% = 0.025$

The average number of missing required elements recorded by the required element judges are calculated and called a_q this average is rounded to a whole number, the factor F_q is then multiplied by a_q, the result is called q. ($q = F_q \times \lfloor a_q \rceil$) (Note that required elements are counted per instance of each required element, not per group of required elements, for example, if the required elements are 4 basic jumps and 4 double unders and the athlete performs 2 basic jumps and 3 double unders this corresponds to $2 + 1 = 3$ missed required elements)

The required elements (q) are subtracted from 1 to be converted into a factor, the result is called Q ($Q = 1 - q$)

▼ Simplified

Each missing execution of a required element contributes a 2.5% deduction. For example, in an individual Single Rope freestyle routine:

	Number required	Number performed	Missing required elements	deduction
Multiples	4	4	0	0
Gymnastics/Power	4	3	1	2.5%
Wraps/Releases	4	1	3	7.5%
			Total required element deduction:	10%

Result

The result/routine score (called R) is obtained by multiplying the difficulty score (D) subtracted by the repetition score (U) with the presentation score (P), the deduction score (M), and the required elements score (Q). The result cannot be lower than 0.

$$R = (D - U) \times P \times M \times Q$$

Calculating Show Freestyle scores

The results for the show freestyle are generally calculated in the same way as other freestyles, but with the following exceptions.

Presentation

The presentation score may impact the difficulty score by a factor of $F_p = 50\% = 0.50$
Where the Form and Execution category may impact the score by a factor of $F_{p,F} = \frac{1}{4}F_p$,
the Style category may impact the score by a factor of $F_{p,S} = \frac{1}{4}F_p$,
the Entertainment category may impact the score by a factor of $F_{p,W} = \frac{1}{4}F_p$,
the Musicality category may impact the score by a factor of $F_{p,M} = \frac{1}{4}F_p$

x can be F, S, E, or M, for the category to accommodate Style. j_S, and a_s are calculated the same way as other j_x, and a_x; and a_S is added to P the same way as other a_x.

Required disciplines

These are calculated like the Freestyle Required Elements, however a required discipline can be either performed or not performed, hence the maximum number of uncompleted required disciplines are the same as the number of required disciplines

Each missed required discipline may impact the score by a factor of $F_q = 5\% = 0.05$

Calculating the ranking

Speed events

The athlete or team with the highest result (R) is ranked first (rank 1). The athlete with the second highest result is ranked second, (rank 2) and so on.

In the case of a tie, where the number of athletes or teams (m) have the same result (R), which would result in the rank (n), all those athletes or teams are awarded the same rank (n). The next best result (R) is ranked with rank plus the number of teams/athletes ($n + m$). For example, if 3 athletes ($m = 3$) have the same speed score and rank 4th, they all get ranked fourth (rank 4). The athlete with the next score gets ranked seventh, (rank 7) since n is 4 and m is 3 their sum is 7 ($4 + 3 = 7$).

Freestyle events

The athlete or team with the highest result (R) is ranked first (rank 1). The athlete with the second highest result is ranked second, (rank 2) and so on.

In case of a tie, where multiple teams or athletes have the same result (R), the athletes or teams will be further compared based on their deduction score (M). The athlete or team with fewer deductions is ranked first.

If this does not resolve the tie, the athletes or teams with the same result, and deduction score will be further compared based on their Required Elements score (Q). The athlete or team with fewer missed required elements are ranked first.

If this does not resolve the tie, the athletes or teams with the same result, deduction score, and required elements score will be further compared based on their presentation score (P). The athlete or team with the higher presentation score is ranked first.

If this does not resolve the tie, the athletes or teams with the same result, deduction score, required elements score, and presentation score will be further compared based on their repeated skills score (U). The athlete or team with the lower score is ranked first.

If this does not resolve the tie, the athletes or teams with the same result, deduction score, required elements score, presentation score and repeated skills score will be further compared based on their difficulty score (D). The athlete or team with the higher difficulty score is ranked first.

If this does not resolve the tie and there are m athletes or teams with the same result, deduction-, required elements-, presentation-, repeated skills-, and difficulty score, which would result in the same rank n, all those athletes or teams are awarded rank n. The next best result (R) is ranked with rank $n + m$.

Overall and All-Around results

The winner of the overall/all-around competitions is determined by the sum of their ranks in each event. The winner will have the lowest rank sum. For example, if an athlete places rank 1, rank 2, rank 3 in their three events, the sum of their ranks is 6 ($1 + 2 + 3 = 6$). (the rank sum is called T)

When calculating the ranks for the component events of an overall/all-around, only athletes or teams competing in the overall/all-around should be taken into account.

In the Individual Overall Competition, the rank for the Single Rope Individual Freestyle get multiplied by 2 before adding it to the rank sum.

In case of a tie, the scores for each event are recalculated into a normalised score to preserve the differences between the scores while still making the events play an equal role in the result.

The highest score in an event gets a score of 100, the lowest score gets a score of 1.

To convert a result (R) into a normalised score, the highest score of the competitors in that event entered into the Overall/All-Around is called R_{max}, the lowest score is called R_{min}, the normalised score is called N and the following operation is performed for each entry:

$$N = \frac{(100 - 1)\,(R - R_{min})}{R_{max} - R_{min}} + 1$$

In the Individual Overall Competition N for Single Rope Individual Freestyle is multiplied by 2 to give freestyle a simulated equal impact as speed.

The normalized scores for all the events are then summarized into a total normalized score, the tie breaker (called B) The athlete/team with the highest total normalized score is ranked first in the tie, the second best total normalized score is ranked second and so on.

The results

All published results must be accompanied with details identifying the event(s), and athlete(s) or team(s). Each athlete/team should have a unique id, name/team name, country/club, and, for team events, names of the athletes competing the event published with their results.

Scores that are used as multiplication factors should preferably be written as a percentage and not as a factor, it is advised to write for example -10% rather than 0.9 and $+17\%$ rather than 1.17.

Unofficial results

Prior to results being verified and authorized, some results may be published as unofficial scores. These are unofficial scores and not finalized until results are officially published and announced. It is not required to publish unofficial results and all variables are optional.

For speed events, the result (R) and rank (S) may be published.

For freestyle events, the result (R), difficulty score (D), presentation score (P), deduction score (M), required elements score (Q), repeated skills score (U), and rank (S) may be published.

For overall and all-arounds, the result for each component event (R), normalised score for each event (N), total normalised score (B), rank for each component event (S), rank sum (T), and total rank (S) may be published.

Official results

After all verifications have been made, the results can be published. These should include everything listed under unofficial results with the difference that only N and B are optional (they must be published if a tie had to be resolved in that Overall or All-Around category)

Signals, sounds and call outs

Timing

All time durations in this specification are measured relative to the start of the `start-BEEP` in the beginning of the time track and is measured until the start of another sound.

Tones

`start-BEEP`
: Defined as a square wave at 578.3 Hz, this correlates do a D_5 in standard tuning (A = 440 Hz) playing for 0.350 seconds.

`switch-BEEP`
: Defined as a square wave at 493.9 Hz, this correlates to a B_4 in standard tuning (A = 440 Hz) playing for 0.350 seconds.

`soft-BEEP`
: Defined as a sine wave at 578.3 Hz for 0.350 seconds.

Start

All speed time tracks should start as follows:

> `<Event Name> <Event Time> <1.000 seconds silence> Judges Ready? <0.500 seconds silence> Athletes Ready? <0.500 seconds silence> Set <0.500 seconds silence> <start-BEEP>`

Where `<Event Time>` is defined as `[<N> by] <Time>` seconds" where `[<N> times]` is only required if the event is performed in a relay fashion. (For example: "four by thirty seconds" or "one hundred eighty seconds") All time definitions in the event presentation come in seconds.

The `<Event Name>` is stated as defined in the competition manual.

For freestyle events, after the athlete has been introduced, their music will begin after a short pause.

Switch

When the defined amount of time has elapsed since the beginning of the previous `start-BEEP` / `switch-BEEP` and another athlete's part of a relay fashion event should commence a `switch-BEEP` should sound.

Stop

When the defined amount of time has elapsed since the beginning of the previous `start-BEEP` / `switch-BEEP` and the event should stop a `start-BEEP` should sound.

Time call outs

For speed and multiple events where each section of the event is shorter than or equal to 60 seconds in duration there should be time call outs every 10 seconds in the form of `<Seconds>` where is the number of seconds elapsed since the previous `start-BEEP` / `switch-BEEP` .

For speed and multiple events where each section of the event is longer than 60 seconds in duration there should be time call outs every 60 seconds in the form of `<Minutes> minute(s)` where `<Minutes>` is defined as the number of minutes elapsed since the last `start-BEEP` / `switch-BEEP` . In addition to this there should be call-outs every 15 seconds in the form of `<Seconds>` where `<Seconds>` is the number of seconds elapsed since the previous `start-BEEP` / `switch-BEEP` or minute call-out.