

DUCKWORTH-LEWIS METHOD OF RE-CALCULATING THE TARGET SCORE IN AN INTERRUPTED MATCH

The Professional Edition of the Duckworth-Lewis method shall be used in all matches. If any match is suspended after it has started such that the number of overs available to be faced by either side is reduced from that determined when the match started, the revised target shall be computed using the latest version of the 'ICC Duckworth/Lewis Calculator' as distributed by ICC in accordance with the instructions provided with that software.

Where possible, arrangements shall be made for the provision of back-up capability, in case of computer malfunction, for the operation or continued operation of the Professional Edition. In the event of computer non-availability or malfunction where no such provision has been made, the Standard Edition (the method in use prior to October 2003) shall be used.

The regulations given below describe only the operation of the Standard Edition, except that Clauses 4, 6 and 7 are also applicable to the Professional Edition.

1 Introduction

The D-L method sets revised targets in rain-interrupted limited-overs matches in accordance with the relative run scoring resources which are at the disposal of the two sides.

These are not in direct proportion to the number of overs available to be faced, as with the average run rate method of correction. Instead they depend on how many overs are to go and how many wickets are down when the interruptions occur.

To calculate the revised targets, you need to know the resources available at the stage of the match when suspensions and resumption of play occur. All possible values of resources have been pre-calculated and these are listed in the accompanying table.

The table covers each individual ball in a game of up to 50-overs per side. The figures given in the table are percentages of the resources available for a complete 50-over innings.

For matches with less than 50-overs per innings before they start, the resource percentages available at the start of an innings will be less than 100%. But the same table and the same method of calculation are used whatever the number of overs per innings.

The single sheet over-by-over version of the table can be used for cases when play is suspended before the start of a new over.

When Team 2 (the side batting second) have less run scoring resources at their disposal than had Team 1 (the side batting first), their target is adjusted downwards using the ratio of the resources available to the two sides.

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But when Team 1's innings has been interrupted, it often happens that Team 2 have more resources at their disposal than had Team 1 and it is now necessary to adjust Team 2's target upwards. In this case the adjustment is based on the runs that would be expected to be scored on average from the extra resources at their disposal. The number of these extra runs required is calculated by applying the excess resource percentage to the average total score in a 50-over innings, referred to here as **G₅₀**.

For matches involving ICC full member nations, or for matches between teams that play first class cricket, the value of **G₅₀** should be 245.

For lower levels of the game:

- under 19 international matches
- under 15 international matches
- women's international matches
- matches between associate ICC member nations

the value of **G₅₀** should be 200.

2 Definitions

- The team batting first are referred to as 'Team 1' and the team batting second are referred to as 'Team 2'.
- In the table decimal fractions of an over are expressed in standard cricket notation; i.e. 4.3 overs means 4 overs plus 3 balls.
- The terms 'target' and 'revised target' are reserved exclusively for the minimum score Team 2 need to win.
- As with an uninterrupted match, if Team 2 make a score which is one run short of the target, the match is tied.

The following symbols are used throughout:

N is the number of overs per innings for the match as decided at the moment of delivery of the first ball of the match.

S is Team 1's total score.

R₁ is the resource percentage (relative to a full 50-over innings) available to Team 1.

R₂ is the resource percentage (relative to a full 50-over innings) available to Team 2.

T is Team 2's target score.

3 Calculation of the Percentage Resource Lost by a Suspension in Play

To compensate for any loss of overs due to a suspension in play during either Team 1's or Team 2's innings, it is necessary first to calculate the resource percentage that has been lost on account of this suspension.

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If the suspension occurs between overs, use the sheet of the table which gives the figures for whole numbers of overs. If it occurs mid-over, use the sheets of the table which provide the figures for each individual ball.

- 3.1 For the start of the suspension in play, from the table note the resource percentage that remained for the appropriate number of overs/balls left and wickets lost.
- 3.2 For the resumption of play after the suspension, from the table note the resource percentage now remaining for the revised number of overs/balls left and for the same number of wickets lost.
- 3.3 Subtract the resource percentage in 3.2 from that in 3.1 to give the resource percentage lost.
- 3.4 If a suspension in play causes the innings to be terminated, the resource percentage on resumption (3.2) is zero and the percentage lost is the resource percentage which was remaining when the suspension occurred (3.1).
- 3.5 If more than one suspension in play occurs, the resource percentages lost are calculated as described in 3.1 to 3.4 and are accumulated to give updated values for the total resource percentage lost or resource available for the innings. This is done after each suspension as described in 5.2 and 5.5.

4 Penalties for Slow Over Rates

No overs penalties are imposed for slow over rates and hence slow over rates have no effect on revised target calculations.

5 Calculation of Revised Targets

- 5.1 Note the number of overs per innings decided at the start of the game, **N**. From the table note the resource percentage available to Team 1 at the start of their innings.
(For **N = 50** this is 100%.)
- 5.2 For all suspensions and any premature termination of Team 1's innings, calculate the total resource percentage lost using the procedure described in section 3. Subtract this from the starting resource percentage (5.1) to give **R₁**, the resource which was available to Team 1 for their innings. Note Team 1's total score, **S**.
- 5.3 There is no overs penalty for slow over rates by either side.
- 5.4 Note the number of overs allocated to Team 2 at the start of their innings and from the table note the resource percentage for this number of overs remaining and 0 wicket lost. This is **R₂**, the resource percentage available to Team 2. If **R₂** differs from **R₁**, which will happen if Team 1's innings was interrupted and/or Team 2's was delayed, a revised target must be set. Calculate this revised target, **T**, as described in 5.6 below.

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5.5 For each suspension of play during Team 2's innings or for premature termination of the match, update the resource percentage available, **R2**, by subtracting the resource percentage lost calculated as in **section 3**. Calculate the revised target, **T**, after each suspension as described in 5.6 below. If the match has to be terminated, the result is decided by comparing Team 2's score at the time with the 'par score', this being the value as calculated in the formulae for **T** in 5.6 below, but without the one run added.

If it is greater, Team 2 win. If it is equal, the match is tied. If it is less, Team 1 win.

5.6 If **R2** is less than **R1**, Team 2's revised target is obtained by reducing Team 1's score **S** in the ratio of **R2** to **R1**, ignoring any figures after the decimal point, and adding one run

i.e. $T = (S \times R2/R1) + 1$ (rounded down to a whole number, if necessary).

If **R2** is equal to **R1**, no revision is needed and Team 2's target is one more run than Team 1's score.

i.e. $T = S + 1$

If **R2** is greater than **R1**, calculate the amount of excess resources,

$R2 - R1$, and take this percentage of the average 50-over total, **G50**, to give the extra runs needed, ignoring any figures after the decimal point.

i.e. $T = S + (R2 - R1) \times G50/100 + 1$ (rounded down to a whole number, if necessary)

6 Penalty Runs

6.1 During Team 1's innings

If penalty runs are awarded to the batting side, then their score shall advance accordingly and be taken into account when performing any future D/L calculation.

If penalty runs are awarded to the fielding side, then any D/L calculation in between innings will be performed as normal, and their innings will commence with the score equivalent to the number of penalty runs that they have been awarded.

6.2 During Team 2's innings

If penalty runs are awarded to the batting side, then their score shall advance accordingly. These penalty runs do not affect any subsequent D/L calculation.

If penalty runs are awarded to the fielding side, then there will be no recalculation of any D/L target. Instead, the target score and the entire schedule of par scores will advance by the appropriate number of penalty runs. If a loss of overs occurs after such a penalty has been awarded, then the D/L target will be calculated based upon the original score of the side batting first, and this target, and all par scores, will then be raised by the appropriate number of penalty runs.

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7 The Result and its Description

When a revised target has been calculated and the match has been played out to its completion, the result is described exactly as in the case of an uninterrupted match; if Team 2 achieve their revised target they win by the number of wickets they have in hand when they reach this score; if they fall short of their revised target by exactly one run the result is a tie, and if they make a lower score Team 1 win by the margin of runs by which Team 2 fall short of the score needed to achieve a tie.

When a match has to be abandoned with Team 2's innings in progress (provided sufficient overs have been bowled to constitute a viable match), the result is decided by comparing Team 2's score with the 'par score' as defined in 5.5 and the winning margin is described in terms of the number of runs by which their score differs from the 'par score', regardless of whether Team 1 or Team 2 are the victors.

Whenever a completed game has involved the use of the D/L method, the description should be qualified by appending '(D/L method)'.

7.1 Examples of result description:

- i Team 2 are set a revised target of 186. But they only succeed in making 180 in their allocation of overs. They thus fall 5 runs short of the 185 runs needed to tie the match and the result is described as 'Team 1 win by 5 runs (D/L method)'.
- ii Team 2 are chasing a target of 201 in a 50-over per innings match and reach 105/4 after 25 overs when rain causes the match to be abandoned. At this point the 'par score' is 100. Team 2 have exceeded this by 5 runs and so the result is described as 'Team 2 win by 5 runs (D/L method)'.

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Example 1 (Suspension during Team 1's innings)

In a 50 over-per-innings match, Team 1 reaches 79/3 after 20 overs and then there is a suspension in play. It is decided that 20 overs of the match should be lost, 10 of these by each team. Team 1 resumes to reach a final total of 180 in its revised allocation of 40 overs.

Number of overs per innings at the start of match, $N = 50$

Resource percentage available to Team 1 at start of innings = 100% (5.1)

Resource percentage remaining at suspension (30 overs left, 3 wkts lost) = 61.6% (3.1)

Resource percentage remaining at resumption (20 overs left, 3 wkts lost) = 49.1% (3.2)

Resource percentage lost due to suspension = $61.6 - 49.1 = 12.5\%$ (3.3)

Resource percentage available to Team 1, $R_1 = 100 - 12.5 = 87.5\%$ (5.2)

Number of overs available to Team 2 at the start of its innings = 40

Resource percentage available (40 overs left, 0 wkt lost), $R_2 = 89.3\%$ (5.4)

R_2 is greater than R_1 , i.e. Team 2 has more resource available than had Team 1, so its target should be increased. $S = 180$

Team 2's revised target (5.6) is

$T = S + G50 \times (R_2 - R_1)/100 + 1 = 180 + 245 \times (89.3 - 87.5)/100 + 1 = 185$ (rounded down).

Example 2 (delay to start of Team 2's innings)

In a match in a competition which has 45 overs per innings, Team 1 scores 212 in its allocated 45 overs. Rain then causes Team 2's response to be delayed and it is decided that it should be shortened to 35 overs.

Number of overs at start of match, $N = 45$

Resource percentage available to Team 1 at start of its innings (45 overs left, 0 wkt lost) = 95.0% (5.1).

The innings was not interrupted, so $R_1 = 95.0\%$

Number of overs available to Team 2 at start of its innings = 35

Resource percentage available to Team 2 at start of innings (35 overs left, 0 wkt lost) $R_2 = 82.7\%$ (5.4)

R_2 is less than R_1 ; $S = 212$

Team 2's revised target (5.6) is

$T = S \times R_2/R_1 + 1 = 212 \times 82.7/95.0 + 1 = 185$ (rounded down).

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Example 3 (suspension during Team 2's innings)

In an One Day International match (50 overs per innings), Team 1 has scored 250 from its allocation of 50 overs in an uninterrupted innings. Team 2 has received 12 overs and has scored 40/1. Then play is suspended and 10 overs are lost.

Number of overs at start of match, $N = 50$.

Team 1's innings was uninterrupted, so its resource percentage available, $R_1 = 100\%$ (5.1).

Resource percentage available to Team 2 at start of innings = 100% (5.4).

Resource percentage remaining at suspension (38 overs left, 1 wkt lost) = 82.0% (3.1).

Resource percentage remaining at resumption (28 overs left, 1 wkt lost) = 68.8% (3.2).

Resource percentage lost due to suspension = $82.0 - 68.8 = 13.2\%$ (3.3).

Resource percentage available to Team 2, $R_2 = 100 - 13.2 = 86.8\%$ (5.5).

R_2 is less than R_1 ; $S = 250$.

Team 2's revised target (5.6) is

$T = S \times R_2/R_1 + 1 = 250 \times 86.8/100 + 1 = 218$, and it needs a further 178 runs from 28 overs.

Example 4 (multiple suspensions and abandonment)

Suppose that in Example 3, play continues for a further 10 overs during which Team 2 takes its score on to 98/3, whereupon there is another suspension in play and 2 more overs are lost. A further 8.2 overs are bowled and Team 2 is 154/6 when rain washes out the match.

Team 1's resource percentage is still $R_1 = 100\%$.

Team 2's resource percentage has been reduced further.

Resource percentage remaining at start of second suspension (18 overs left, 3 wkts lost) = 45.9% (3.1).

Resource percentage remaining at end of second suspension (16 overs left, 3 wkts lost) = 42.3% (3.2).

Resource percentage lost due to second suspension = $45.9 - 42.3 = 3.6\%$ (3.3).

Resource percentage available to Team 2, $R_2 = 86.8 - 3.6 = 83.2\%$ (5.5).

R_2 is less than R_1 ; $S = 250$.

Team 2's revised target (5.6) is

$T = S \times R_2/R_1 + 1 = 250 \times 83.2/100 + 1 = 209$ and it needs a further 111 runs from 16 overs.

When the innings had to be terminated, there were 7.4 overs remaining.

Resource percentage remaining at termination of Team 2's innings (7.4 overs left, 6 wkts lost) = 19.4% .

This remaining resource is lost by the termination.

Resource percentage available to Team 2, $R_2 = 83.2 - 19.4 = 63.8\%$ (5.5).

R_2 is less than R_1 ; $S = 250$.

Team 2's par score (5.5 and 5.6) is $S \times R_2/R_1 = 250 \times 63.8/100 = 159$ (rounded down); the par score at the instant of abandonment is 159 and with a score of 154 it has lost by 5 runs.

Team 1 wins by 5 runs (D-L method) (7).

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Example 5 (suspension and termination of Team 1's innings mid-over and delay to Team 2's innings)

This is taken from an actual ODI: India (Team 1) versus Pakistan (Team 2), Singapore, April 1996. Team 1 scores 226/8 in 47.1 of a scheduled 50 overs. Rain then terminates Team 1's innings and delays that of Team 2, which is given a reduced allocation of 33 overs.

Number of overs per innings at start of match, $N = 50$

Team 1's innings:

Resource percentage at start of innings is 100% (5.1).

Resource percentage remaining at termination (2.5 overs left, 8 wkts lost) = 6.9% (3.1).

Resource percentage lost due to termination = 6.9% (3.4).

Resource percentage available, $R_1 = 100 - 6.9 = 93.1\%$ (5.2).

Team 2's innings (allocated 33 overs):

Resource percentage available at start of innings (33 overs left, 0 wkts lost),

$R_2 = 79.8\%$ (5.4).

R_2 is less than R_1 ; $S = 226$.

Team 2's revised target (5.6) is

$T = S \times R_2 / R_1 + 1 = 226 \times 79.8 / 93.1 + 1 = 194$ (rounded down).

Example 6 (as Example 5 but with a further interruption during Team 2's innings)

In the match of the previous example, Team 2 has scored 140 for 2 after 25 overs when a further 5 overs are lost to the weather.

Team 1's resource percentage is still $R_1 = 93.1\%$.

Team 2's innings:

Resource percentage at start of innings (33 overs left, 0 wkt lost) = 79.8% (5.4).

Resource percentage remaining at suspension (8 overs left, 2 wkts lost) = 25.5% (3.1).

Resource percentage remaining at resumption (3 overs left, 2 wkts lost) = 10.4% (3.2).

Resource percentage lost due to suspension = 25.5 - 10.4 = 15.1% (3.3).

Resource percentage available, $R_2 = 79.8 - 15.1 = 64.7\%$ (5.2).

R_2 is less than R_1 ; $S = 226$.

Team 2's revised target (5.6) is

$T = S \times R_2 / R_1 + 1 = 226 \times 64.7 / 93.1 + 1 = 158$ (rounded down) and it needs a further 18 runs from 3 overs.