

# Blaseball: Definitions and Formulations

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## 1 Definitions

### Definition 1.1 (BATTER RATINGS)

The attributes necessary to determine a player's batting rating are: tragicness, thwackability, moxie, divinity, musclitude, patheticism, and martyrdom. Thus:

$$B(x) := (1 - \text{tragicness})^{0.01} * \text{thwackability}^{0.35} * \text{moxie}^{0.075} * \text{divinity}^{0.35} \\ * \text{musclitude}^{0.075} * (1 - \text{patheticism})^{0.05} * \text{martyrdom}^{0.02}$$

### Definition 1.2 (PITCHER RATINGS)

The attributes necessary to determine a player's pitching rating are: shakespeareanism, unthwackability, coldness, overpowerment, and ruthlessness. Thus:

$$P(x) := \text{shakespeareanism}^{0.1} * \text{unthwackability}^{0.5} * \text{coldness}^{0.025} \\ * \text{overpowerment}^{0.15} * \text{ruthlessness}^{0.4}$$

### Definition 1.3 (NEAREST INTEGER FUNCTION)

The code we found uses a rounding function to determine star ratings, so we define the nearest integer function. Note that there are many ways to deal with the edge case of  $x \equiv 1 = 0.5$ . The most common way of handling this is rounding to the nearest even integer, also known as banker's rounding.

$$[x] = \begin{cases} \lceil x \rceil & \text{if } x \equiv 1 > 0.5 \\ \lfloor x \rfloor & \text{if } x \equiv 1 < 0.5 \\ \text{nearest even integer} & \text{if } x \equiv 1 = 0.5 \end{cases}$$

### Definition 1.4 (STAR RATING)

Finally we define how the star ratings are calculated. Simply, the pitcher or batter ratings are divided by 0.2 and then rounded to the nearest 0.5. Using our nearest integer function, we can round any real number  $x$  to a multiple of any other real number  $y$  to obtain an integer  $z$  by applying this rule:  $z = y \left\lceil \frac{x}{y} \right\rceil$ .

Let  $\mathcal{R}(x) \in \{B(x), P(x)\}$ . After some simplifying we finally obtain:

$$S(x) = \frac{\lceil 10 \cdot \mathcal{R}(x) \rceil}{2}$$