

Use Cases

Start new game

- Use case begins when all players agree to start a new game
- If the players don't already have a scorecard with an empty column for the game, give each player a new, blank scorecard. (The scorecard has 6 columns).
- The first empty column in on the scorecard is used for the current game. (In all use cases, whenever a box on the scorecard is referred to, it means the box in the column for the current game.)
- Note: the order in which players take their turns must be determined (if there's more than one player), but the Yahtzee rules do not specify how to determine this, so this will be implementation-specific.
- At the end of this use case, the first player starts his or her turn. (A "Take a turn – rolling dice" use case begins.)

Take a turn – rolling dice

(First roll:)

- The current player rolls all five dice.
- The current player may choose to fill a box on the scorecard. If the player chooses to do so, then this use case ends, and a "Take a turn – filling a box" use case begins for the current player.

(Second roll:)

- The current player selects 0 to 5 dice to hold (or 0 to 4 dice to hold, since there is no point in holding all five dice.)
- The current player rolls all dice that are not held. (All held dice keep the value they had before)
- The current player may choose to fill a box on the scorecard. If the player chooses to do so, then this use case ends, and a "Take a turn – filling a box" use case begins for the current player.

(Third roll:)

- The current player selects 0 to 5 dice to hold (or 0 to 4 dice to hold, since there is no point in holding all five dice.)
- The current player rolls all dice that are not held. (All held dice keep the value they had before)
- The player must now fill a box on the scorecard. A "Take a turn – filling a box" use case begins for the current player.

Take a turn – filling a box

-The current player selects one of the following boxes to fill. The player may only fill an empty box:

- Aces box
 - Twos box
 - Threes box
 - Fours box
 - Fives box
 - Sixes box
 - Three of a kind box
 - Four of a kind box
 - full house box
 - Small straight box
 - Large straight box
 - Yahtzee box
 - Chance box
- The box is filled with a number, based on the values of the five dice and which box was selected:

- Aces box: number of dice showing "Ones"
- Twos box: (number of dice showing "Two") * 2
- Threes box: (number of dice showing "Three") * 3
- Fours box: (number of dice showing "Four") * 4
- Fives box: (number of dice showing "Five") * 5
- Sixes box: (number of dice showing "Six") * 6
- Three of a kind box: Sum of values on all dice if at least three dice have the same value. "0" otherwise
- Four of a kind box: Sum of values on all dice if at least four dice have the same value. "0" otherwise
- full house box: "25" if three dice have the same value and the other two dice have a different value but are the same as each other. "0" otherwise.
- Small straight box: "30" if the values on four dice form a consecutive sequence. "0" otherwise.
- Large straight box: "40" if the values on all five dice form a consecutive sequence. "0" otherwise.
- Yahtzee box: "50" if all five dice show the same value. "0" otherwise
- Chance box: Sum of values on all dice
- If all players have filled all thirteen boxes, begin the "Finish Game" use case. Otherwise, the next player begins his or her next turn (start "Take a turn – rolling dice" use case for the next player). (Note: if there is only one player, the next player is the same as the current player)

Finish Game

- For each player, show their final score for the game. The final score is computed as follows:
 - subtotal = sum of values in all thirteen boxes
 - final score = subtotal if (sum of Aces, Twos, Threes, Fours, Fives, and Sixes boxes) < 63
= subtotal + 35 otherwise. (upper section bonus)
- If there is more than one player, declare the player with the highest score as the winner.

Operational Variables and Motivation for Each

- The value showing on the die, for each of the five dice. (Motivation: it affects the scores that get entered into the boxes)
- Whether or not the die is held, for each of the five dice. (Motivation: it determines whether or not the die gets a new random value when the player rolls)
- Number of players. (Motivation: if there's more than one player, a winner must be announced at the end of the game.)
- Whether or not the box is empty and the number in the box, for each of the thirteen score boxes that each player has on his/her scoresheet. (Only needed for the current game – we don't care about the score for past games, and for future games, we know the whole column of boxes is empty). (Motivation: determines whether the player can still fill the box and determines the player's score)
- How many of the six game columns on the current scorecard have been filled (and whether the players have even received a scorecard, if they are not automatically given one at the start). (Motivation: it determines which column on the scorecard must be filled for the current game, and whether or not the players need a new scorecard when they start a new game.)
- How many times the current player has rolled in the current turn. (Motivation, determines whether the player may hold dice and whether he or she may roll again)

List of Tests

D/C = Don't Care.

y = Yes

n = No

Start new game

Columns filled on scorecard	Result
Players do not have scorecards yet OR zero columns are full (depending on implementation).	New scorecard given to each player, game begins, using first column for the game. First player's turn begins.
All columns are full.	New scorecard given to each player, game begins, using first column for the game. First player's turn begins.
1 column is full	The next column on the scorecard gets used for the game. First player's turn begins.
2 columns are full	The next column on the scorecard gets used for the game. First player's turn begins.
3 columns are full	The next column on the scorecard gets used for the game. First player's turn begins.
4 columns are full	The next column on the scorecard gets used for the game. First player's turn begins.
5 columns are full	The next column on the scorecard gets used for the game. First player's turn begins.

Take a turn – rolling dice

Number of times player has rolled this turn	Die 1 is held	Die 2 is held	Die 3 is held	Die 4 is held	Die 5 is held	Result
0	n	n	n	n	n	All dice are rolled.
0	y	n	n	n	n	Disallowed.
1	n	n	n	n	n	All dice are rolled.
1	y	n	n	n	n	Die 1 keeps value, others are rolled.
1	n	y	n	n	n	Die 2 keeps value, others are rolled.
1	n	n	y	n	n	Die 3 keeps value, others are rolled.
1	n	n	n	y	n	Die 4 keeps value, others are rolled.
1	n	n	n	n	y	Die 5 keeps value, others are rolled.
1	y	n	y	n	y	Die 1, 3, and 5 keep values, others are rolled.

2	n	n	n	n	n	All dice are rolled.
2	y	n	y	n	y	Die 1, 3, and 5 keep values, others are rolled.
3	D/C	D/C	D/C	D/C	D/C	Disallowed.

Take a turn – filling a box

Box selected	Selected box is already filled?	Values on dice	Number of times player has rolled this turn	All players have completely filled their scorecards once the box is filled?	Result
D/C	n	D/C	0	D/C	Disallowed.
D/C	n	D/C	1	D/C	(Allowed.)
D/C	n	D/C	2	D/C	(Allowed.)
D/C	n	D/C	3	D/C	(Allowed.)
D/C	n	D/C	D/C	y	Box filled, game ends (actions specified in "Finish Game" use case occur).
D/C	n	D/C	D/C	n	Box filled, next player's next turn begins.
Aces	y	D/C	D/C	D/C	Disallowed.
Twos	y	D/C	D/C	D/C	Disallowed.
Threes	y	D/C	D/C	D/C	Disallowed.
Fours	y	D/C	D/C	D/C	Disallowed.
Fives	y	D/C	D/C	D/C	Disallowed.
Sixes	y	D/C	D/C	D/C	Disallowed.
3 of a kind	y	D/C	D/C	D/C	Disallowed.
4 of a kind	y	D/C	D/C	D/C	Disallowed.
Full house	y	D/C	D/C	D/C	Disallowed.
Small straight	y	D/C	D/C	D/C	Disallowed.
Large straight	y	D/C	D/C	D/C	Disallowed.
Yahtzee	y	D/C	D/C	D/C	Disallowed.
Chance	y	D/C	D/C	D/C	Disallowed.
Aces	n	No Ones	D/C	D/C	Box filled with 0
Aces	n	At least two Ones	D/C	D/C	Box filled with sum of values on dice showing "One"
Twos	n	No Twos	D/C	D/C	Box filled with 0

Twos	n	At least two	D/C	D/C	Box filled with sum of values on dice showing "Two"
Threes	n	No Threes	D/C	D/C	Box filled with 0
Threes	n	At least two Threes	D/C	D/C	Box filled with sum of values on dice showing "Three"
Fours	n	No Fours	D/C	D/C	Box filled with 0
Fours	n	At least two Fours	D/C	D/C	Box filled with sum of values on dice showing "Four"
Fives	n	No Fives	D/C	D/C	Box filled with 0
Fives	n	At least two Fives	D/C	D/C	Box filled with sum of values on dice showing "Five"
Sixes	n	No Sixes	D/C	D/C	Box filled with 0
Sixes	n	At least two Sixes	D/C	D/C	Box filled with sum of values on dice showing "Six"
3 of a kind	n	Not 3 of a kind	D/C	D/C	Box filled with 0
3 of a kind	n	3 of a kind	D/C	D/C	Box filled with sum of values on all dice
4 of a kind	n	Not 4 of a kind	D/C	D/C	Box filled with 0
4 of a kind	n	4 of a kind	D/C	D/C	Box filled with sum of values on all dice
Full house	n	Not Full house	D/C	D/C	Box filled with 0
Full house	n	Full house	D/C	D/C	Box filled with 25
Small straight	n	Not Small straight	D/C	D/C	Box filled with 0
Small straight	n	Small straight	D/C	D/C	Box filled with 30
Large straight	n	Not Large straight	D/C	D/C	Box filled with 0
Large straight	n	Large straight	D/C	D/C	Box filled with 40
Yahtzee	n	Not Yahtzee	D/C	D/C	Box filled with 0
Yahtzee	n	Yahtzee	D/C	D/C	Box filled with 50
Chance	n	D/C	D/C	D/C	Box filled with sum of values on all dice.

Finish Game

Number of players	Sum of scores in the player's Ones, Twos, Threes, Fours, Fives, and Sixes boxes	Result
One	D/C	No winner is announced.

More than one	D/C	Player with the highest score is announced as the winner.
One	Less than 63	Player's final score is shown as the sum of the scores in the thirteen boxes.
One	Greater than or equal to 63	Player's final score is shown as the sum of the scores in the thirteen boxes plus 35 (upper section bonus).