The Game of SKUNK

In this lesson, students practice decision-making skills leading to a better understanding of choice versus chance and building the foundation of mathematical probability. This lesson is adapted from an article by Dan Brutlag, "Choice and Chance in Life: The Game of SKUNK," which appeared in Mathematics Teaching in the Middle School, Vol. 1, No. 1 (April 1994), pp. 28-33.

Learning Objectives: Students will:

- • practice decision making skills
- • investigate winning strategies
- • gain a basic understanding of experimental probability

Instructions:

The game of SKUNK presents students with an experience that clearly involves both choice and chance. SKUNK is a variation on a dice game also known as "pig" or "hold'em." The object of SKUNK is to accumulate points by rolling dice. Points are accumulated by making several "good" rolls in a row but choosing to stop before a "bad" roll comes and wipes out all the points. SKUNK can be played by groups, by the whole class at once, or by individuals. The whole-class version is described following an explanation of the rules.

The Game of SKUNK

To start the game each player makes a score sheet like this:

Each letter of SKUNK represents a different round of the game; play begins with the "S" column and continue through the "K" column. The object of SKUNK is to accumulate the greatest possible point total over five rounds. The rules for play are the same for each of the five rounds.

- • At the beginning of each round, every player stands. Then, a pair of dice is rolled. (Everyone playing uses that roll of the dice; unlike other games, players do not roll the dice for just themselves.)
- • A player gets the total of the dice and records it in his or her column, unless a "one" comes up.
- • If a "one" comes up, play is over for that round and all the player's points in that column are wiped out.
- • If "double ones" come up, all points accumulated in prior columns are wiped out as well.
- • If a "one" doesn't occur, the player may choose either to try for more points on the next roll

  (by continuing to stand) or to stop and keep what he or she has accumulated (by sitting down).

S	K	U	N	K

Note: If a "one" or "double ones" occur on the very first roll of a round, then that round is over and each player must take the consequences.

Playing SKUNK with the Whole Class

The best way to teach SKUNK to the class is to play a practice game. You can use the following to simulate the rolling of number cubes by projecting the simulation onto the overhead or television screen. (Go to website below)

Draw a SKUNK score sheet on the chalkboard or overhead transparency on which to record dice throws. Have all students make their own score sheets on their own scrap paper. Have all students stand up next to their chairs. Either you or a student rolls the dice. Suppose a "four" and a "six come up, total 10. Record the outcome of the roll in the "S" column on the chalkboard:

On the first roll, all the players get a total of the dice or a zero if any "ones" come up. Kerry and Lisa are standing up, so they also write "10" in their score sheets.

After each roll, players may choose either to remain standing or to sit down. Those who are standing get the results of the next dice roll; those who sit down keep the score they have accumulated for that round regardless of future dice rolls. Once someone sits down, that person may not stand up again until the beginning of the next round.

Instead of focusing on a single class winner, more students will be drawn into thinking about a strategy for doing well in this game by emphasizing personal goals. When playing the game for the second and third time, ask students to focus on trying to better their own previous score. After each game ask for a show of hands of those who did better than last time.

Score Record

S	K	U	N	K
10				

Kerry

S	K	U	N	K
10				

Lisa

S	K	U	N	K
10				

(For further examples go to the website below)

Thinking about SKUNK

Although playing SKUNK is fun, thinking about SKUNK is essential for student understanding of the underlying concepts. In groups of two or three, students should complete the questions on the handout. (Go to the website link below)

Extension Activity:

1. In groups, students can create a "rating chart". For example: 0 to 20 - needs improvement
   21 to 40 - you might do better
   41 to 60 - average

   61 to 80 - good
   over 80 - outstanding

   This rating chart was devised by assuming that, on average, a "one" happens on about the third dice roll and the average score per good roll is "8." Therefore, with a strategy of "roll twice then stop" on each round, a person might get about 16 points on perhaps four out of five rounds for a total score of about 64. The 20 point intervals used for each category are arbitrary. Whichever rating scale students create, they should justify their reasoning for the intervals.

2. The teacher may have each group of students devise their own game involving choice and chance. Writing up consistent, clear rules for their game will involve mathematical logic. Have each group present its game to the rest of the class. The teacher can eitherlet the whole class choose which of the games they would like to play or take a chance by selecting one of the games at random. Choice or chance? It's decision time!

An Example of a Game of SKUNK

The following is a continuation of the sample game which was begun in the lesson.

For the next two rolls Kerry and Lisa remain standing. A 3 and 2 are rolled, total 5; and then a 5 and a 4, totaling 9. No 1's so far! After three rounds Kerry and Lisa's score sheets look like this:

Kerry is getting nervous and decides to sit down, but Lisa remains standing. The next dice roll comes up double 4's, total 8. Since Kerry sat down, he is done on the "S" round with his total of 24, but Lisa now has 32. Lisa remains standing. The next roll is a 5 and a 1 — disaster for Lisa; her score goes to 0. Here is how their score sheets look:

Since a 1 was rolled, the "S" round is over for everyone.

All students total their scores and stand up to begin the "K" round. On the first roll of the "K" round, a 3 and a 1 are rolled; everyone gets a score of 0. Play continues through the "U" and into the "N" round. No double 1's so far! After two rolls into the "N" round, here is how the chalkboard SKUNK score sheet and Kerry's score sheet look:

Kerry has chosen to play conservatively and is accumulating many points. At the same point in the game, here are the score sheets for Lisa and another student, Nelson:

Nelson isn't doing well. He is hoping for a long streak without any 1's. But how long is long enough? Nelson's strategy seems to be "keep standing until a 1 comes up." This ploy is

obviously a losing strategy. Lisa, however, seems to playing "hunches." Sometimes she takes a big risk and other times, she plays it safe.

Score Records

S	K	U	N	K
10	one	9	4	
5		7	8	
9		6		
8		9		
one		10		
		one		

Lisa

S	K	U	N	K
10	0	9	4	
5		7	8	
9		6		
8		9		
0		10		
		41		

Kerry

S	K	U	N	K
10	0	9	4	
5		7	8	
9		6		
24		22		

Nelson

S	K	U	N	K
10	0	9	4	
5		7	8	
9		6		
8		9		
0		10		
		0		

For the next roll, Lisa decides to sit down. Kerry remains standing. Nelson, continuing with his "no win" strategy, remains standing. Oh no! Double 1's are thrown! Here are the score records and Lisa's sheet:

So far, Lisa has accumulated 41 + 12 = 53 points. Since Kerry and Nelson were both standing when double 1's occurred, here is how their score sheets look:

Nelson and Kerry are tied with totals of 0.

The game continues through the last "K" round. Players then total their scores from all five columns. Students will want to play this game several more times.

Score Records

S	K	U	N	K
10	one	9	4	
5		7	8	
9		6	double	
8		9	ones	
one		10		
		one		

Lisa

S	K	U	N	K
10	0	9	4	
5		7	8	
9		6	12	
8		9		
0		10		
		41		

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Kerry

S	K	U	N	K
10	0	9	4	
5		7	8	
9		6	0	
24		22		
0		0		

Nelson

S	K	U	N	K
10	0	9	4	
5		7	8	
9		6	0	
8		9		
0		10		
		0		