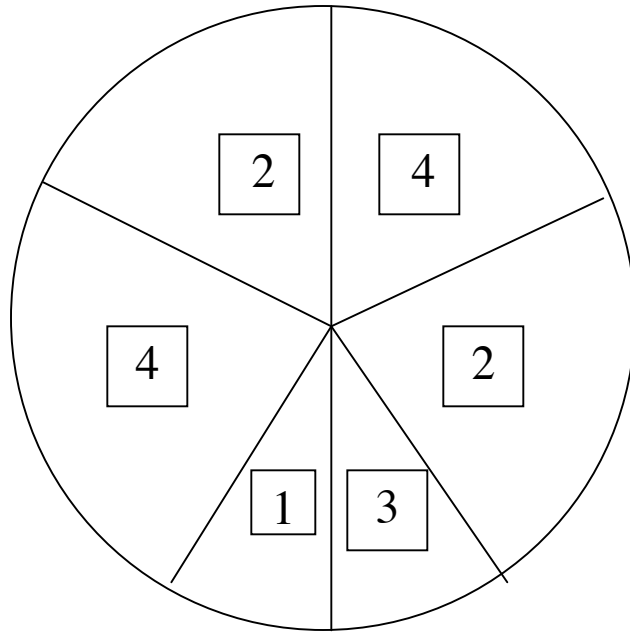


## It's Not Fair!!!

Matt and Sara are playing a game using the spinner found here. Matt gets one point for every time it lands on an odd number. Sara gets a point for each time it lands on an even number. The spins are recorded as such:

Spin #1: 2  
Spin #2: 4  
Spin #3: 4  
Spin #4: 4  
Spin #5: 1  
Spin #6: 2  
Spin #7: 1  
Spin #8: 4  
Spin #9: 3  
Spin #10: 4  
Spin #11: 2  
Spin #12: 1  
Spin #13: 2  
Spin #14: 4  
Spin #15: 3  
Spin #16: 1  
Spin #17: 4  
Spin #18: 2  
Spin #19: 4  
Spin #20: 4



- A) Sara won the game, what was the final score? Show your work.
- B) Matt started to accuse Sara of cheating. After five games, she had won four out of five games. Why would he complain about this game?
- C) To make Matt happy, Sara wants to change the point system. How could she do this to make sure the game is fair? Explain.

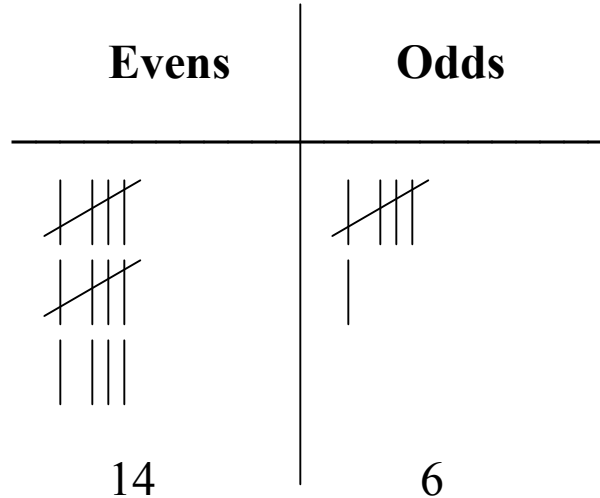
MA-M-3.2.1; MA-M-3.3.4

Scoring Guide  
It's Not Fair!!

- 0 - No response, or one that does not address any of the questions asked.
- 1 - Found the winner of the game with some type of work provided.  
or  
Found the winner of the game with no proof shown, and attempted to explain the game being unfair.
- 2 - Found the winner of the game with some type of work provided and explained the game to be unfair in relation to probability  
or  
Found the winner of the game with no proof shown, and attempted to explain the game being unfair. Attempted to reassign points to make the game fair.
- 3 - Found the winner of the game some type of work provided, and explained the game to be unfair in relation to probability. The points reassigned for part C make the game fair but lacks an explanation .
- 4 - Found the winner of the game some type of work provided, and explained the game to be unfair in relation to probability. The points reassigned for part C make the game fair with a clear and concise explanation.

Sample Level 4 Response:

A) Sara won



B) Matt had noticed that Sara was out scoring him in almost every game. He should look at the theoretical probability of winning this game. The spinner is divided unequally. The “1” has a  $1/10$  chance of being spun. The “2” has a chance of  $2/5$  chance of being spun. The “3” has a  $1/10$  chance of being spun. The “4” has a  $2/5$  chance of being spun. Matt had the odds and the odds have a total chance of  $1/5$  of being spun. Sara had the evens and evens have a total chance of  $4/5$  chance of winning. Sara clearly has an advantage over Matt, therefore the game is unfair.

C) In 100 spins, Sara would be expected to score 80 times because she has  $8/10$  of the circle, Matt would expect to score 20 times because he has  $1/5$  of the circle. Sara should get 0.625 points every time she scores and Matt should get 2.5 points.

$$80 * 0.625 = 50 \text{ points}$$

$$20 * 2.5 = 50 \text{ points}$$