6th Grade GPS Task: Dice Game Task
Teacher Directions

Michael, Janet, Kareta, and Chan are playing a game. Each person has chosen two special numbers between 2 and 12. Here are the numbers they chose:

Michael 7 and 8
Janet 5 and 10
Kareta 11 and 12
Chan 4 and 9

They each take turns rolling a pair of dice. Each person receives 8 points whenever the total number of dots on the two dice is equal to one of their special numbers. The winner is the first person to get more than 100 points.

1. Who do you think will win and why?
2. Play the game. Roll a pair of dice over and over again. Every time you roll, record the total of the dice and the number of points scored for each of the 4 people. Stop rolling when someone wins (makes more than 100 points). Who wins? Who would you expect to win if you played the game again? Why?
3. Make a graph or some display showing the experimental probabilities of rolling each total from 2 to 12. Using this information, for each person, Michael, Janet, Kareta, and Chan, calculate the experimental probability of rolling one of their special numbers.
4. Make another display, like the one you did in part 3, showing the theoretical probabilities of rolling each total from 2 to 12. Using this information, for each person, Michael, Janet, Kareta, and Chan, calculate the theoretical probability of rolling one of their special numbers.
5. Using the displays you made in part 3 and 4, compare theoretical probabilities with experimental probabilities. Are they different? How? Can you explain the reason for these differences?
6. What would you expect if you played the game again? Why?

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Discussion, Suggestions, Possible Solutions

The students should have a good understanding of experimental and theoretical probability from TASK 1 before beginning this task.

For an extension involving the fairness of a game see Balanced Assessment Package1, Task 5: Sum of Seven.

Technology could be used again in allowing the students to prepare their displays, see TASK 1 Possible Solution section on how to setup a spreadsheet to simulate rolling dice.

1.) *A table can be created to determine the theoretical probabilities of the sun of the die:*

	ROLL 1					
ROLL 2	1	2	3	4	5	6
1	**2**	**3**	**4**	**5**	**6**	**7**
2	**3**	**4**	**5**	**6**	**7**	**8**
3	**4**	**5**	**6**	**7**	**8**	**9**
4	**5**	**6**	**7**	**8**	**9**	**10**
5	**6**	**7**	**8**	**9**	**10**	**11**
6	**7**	**8**	**9**	**10**	**11**	**12**

Theoretical Probabilities of having a sum from 2- 12:
2: 1/36; **3**: 2/36 = 1/18; **4**: 3/36 = 1/12; **5**: 4/36 = 1/9; **6**: 5/36; **7**: 6/36 = 1/6; **8**: 5/36; **9**: 4/36 = 1/9; **10**: 3/36 = 1/12; **11**: 2/36 = 1/18; **12**: 1/36

Therefore, of each roll of the dice Michael has a 11/36 chance of gaining points; Janet has a 7/36 chance of gaining points, Kareta has a 3/36 chance of gaining points; and Chan has a 7/36 chance of gaining points. Thus, Michael has the best chance of winning the game.

2 -6.) The students can simulate rolling the dice using a spreadsheet program or a graphing calculator and then graph their data. The graphs will depend upon their simulations.