# 7.SP Election Poll, Variation 2

## Task

Members of the seventh grade math group have nominated a member of their group for class president. Every student in seventh grade will cast a vote. There are only 2 candidates in the race, so a candidate must receive at least 50% of the vote to be elected. It is expected to be a tight race, so the math group wants to conduct a survey to gain information on their candidate's prospects. They do not have the time to interview all seventh graders in the school (even if they could contact them) so they decide to interview a sample of 40 students from that grade. They obtain the seventh grade list of names from their school principal's office and select the sample form this list. They plan to ask each sampled student whether they plan to vote for their candidate or the other candidate.

a. The students would like to select the sample of 40 in order to have the best chance of obtaining a representative sample. Describe how to use the random number table provided below to select the sample of 40 students.

**Random Number Table Generated in Excel**

| 196 | 14 | 57 | 441 | 219 |
|-----|-----|-----|-----|-----|
| 459 | 284 | 356 | 306 | 119 |
| 358 | 241 | 406 | 122 | 390 |
| 238 | 98 | 392 | 433 | 256 |
| 335 | 189 | 24 | 260 | 452 |
| 468 | 106 | 28 | 294 | 46 |
| 20 | 385 | 37 | 109 | 4 |
| 437 | 70 | 464 | 471 | 432 |
| 454 | 474 | 1 | 280 | 117 |
| 492 | 390 | 154 | 115 | 336 |
| 460 | 377 | 101 | 312 | 350 |
| 115 | 126 | 64 | 333 | 291 |
| 445 | 297 | 449 | 171 | 234 |
| 438 | 224 | 357 | 13 | 500 |
| 288 | 284 | 254 | 86 | 173 |
| 449 | 340 | 11 | 9 | 387 |
| 359 | 133 | 494 | 31 | 458 |
| 217 | 174 | 343 | 3 | 350 |
| 171 | 195 | 127 | 141 | 276 |
| 299 | 246 | 394 | 164 | 294 |

b. All of the 40 students selected from the list of seventh graders in the school responded to the survey. The results showed that 18 of the 40 students surveyed said they would vote for the math group's candidate. The math group is puzzling over whether this provides enough information for them to get a sense of what will happen in the election. To get a sense of the sample-to-sample variability of the sample proportion associated with a sample of size $n = 40$, the math group decides to simulate the sampling process. To do so, they assume that the seventh grade class is divided 50-50 between the two candidates (50% voting for the math group candidate and the other 50% voting for the other candidate).

For their simulation, they represent each 7th grader by a marble in a box. A seventh grader voting for the math group's candidate is represented by a green marble while a seventh grader voting for the opposing candidate is represented by a blue marble in the box. Suppose that to simulate the sampling of 40 students, they draw 40 marbles from the box containing a number of marbles equal to the 7th grade class size, with 50% of the marbles blue and 50% green. They simulate this sampling process 100 times with the results shown on the following dot plot:

Number of Green Marbles Sampled in Each Simulation
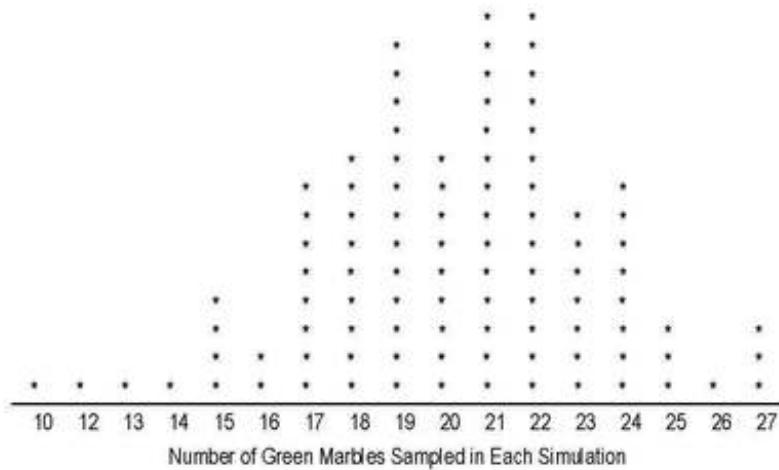
i. How many times does a selected sample indicate that 18 or fewer students out of the 40 sampled would vote for the math group's candidate?

ii. Assuming it is accurate to say that there was a 50-50 chance of winning for each of the two candidates, does it appear likely that in a sample of size 40, 18 or fewer would vote for the math group's candidate?

iii. Using your answers to (i) and (ii), should the math group students conducting the poll be discouraged, or is it reasonable to think their candidate might win? Why or why not?