Tall Girls
According to the National Center for Health Statistics, the distribution of heights for 16-year-old females is modeled well by a Normal density curve with mean $\mu = 64$ inches and standard deviation $\sigma = 2.5$ inches. To see if this distribution applies at their high school, an AP Statistics class takes an SRS of 20 of the 300 16-year-old females at the school and measures their heights. What values of the sample mean $X$ would be consistent with the population distribution being $N(64, 2.5)$? To find out, we used Fathom software to simulate choosing 250 SRSs of size $n = 20$ students from a population that is $N(64, 2.5)$. The figure below is a dotplot of the sample mean height $X$ of the students in the sample.

(a) Is this the sampling distribution of $X$? Justify your answer.

(b) Describe the distribution. Are there any obvious outliers?

(c) Suppose that the average height of the 20 girls in the class’s actual sample is $X = 64.7$. What would you conclude about the population mean height $\mu$ for the 16-year-old females at the school? Explain.
Choosing Cards

We used Fathom (statistical computer software) to simulate choosing 500 SRSs of size 5 from the deck of cards described in the Alternate Activity on the previous page. The graph below shows the distribution of the sample median for these 500 samples.

(a) Is this the sampling distribution of the sample median? Justify your answer.

(b) Suppose that another student prepared a different deck of cards and claimed that it was exactly the same as the one used in the activity. However, when you took an SRS of size 5, the median was 4. Does this provide convincing evidence that the student’s deck is different?