Expected Counts in Two-Way Tables Quiz

1. Ecologists conducted a study to investigate the potential ecological impact of golf courses. Investigators monitored the reproductive success of bluebirds in birdhouses at nine golf courses and ten similar birdhouses at nongolf sites. Data on nests in birdhouses occupied only by bluebirds are shown in the table.

Observed Number of Nests per Birdhouse by Location

	0 nests	1 nest	2 or 3 nests	Total
Golf	30	42	8	80
Nongolf	40	58	22	120
Total	70	100	30	200

If the proportions of nests occupied is the same for golf and nongolf sites, what would be the expected count of birdhouses with 1 nest in nongolf locations?

(A) 40
(B) 42
(C) 50
(D) 58
(E) 60 ✓

Answer E

Correct. The expected count is given by $\frac{(\text{row total})(\text{column total})}{\text{table total}}$. The row total is 120, the column total is 100, and the table total is 200.

2. Nonnative speakers of English often have characteristics in their handwriting that differ depending on the speaker's first language. Handwriting samples from a random sample of Chinese, Malay, and Indian children in a school in Singapore were taken to investigate these differences. One characteristic of interest was a rounding at the top of the capital letter *A*. Data for the top-rounding characteristic for a sample of 153 children are shown in the table.

Observed Top Rounding on the Capital Letter A

	Malay	Indian	Chinese	Total
Yes	9	21	8	38
No	42	31	42	115
Total	51	52	50	153

If children from these countries exhibit top rounding in the same proportions, what is the expected count for Malay children who show top rounding?

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(A) $\frac{9}{38}$

(B) $\frac{9}{51}$

(C) 9

(D) $\left(\frac{(38)(51)}{153}\right)$ ✓

(E) $\left(\frac{(38)(9)}{153}\right)$

Answer D

Correct. The expected count is given by $\frac{(\text{row total})(\text{column total})}{\text{table total}}$. The row total is 38, the column total is 51, and the table total is 153.

3. The National Park Service writes materials for students to use while in the parks. In a study of the effectiveness of some of these materials, a random sample of students was selected to take a short quiz about oak trees after using these materials. A random sample of park professionals also took the quiz. Investigators compared classifications (low, medium, and high) of the crown shapes—the general shapes of the leafy parts of the trees—made by students in grades 6 through 12 with classifications made by professionals. Data from the study are shown in the table.

	Professionals	**Students**	**Total**
Low	54	43	97
Medium	48	39	87
High	7	9	16
Total	109	91	200

If the professionals and the students do not differ in the distributions of their responses, which of the following is equal to the expected number of students who classify the crown shapes as medium?

(A) 39

(B) $\left(\frac{(39)(87)}{91}\right)$

(C) $\left(\frac{(87)(91)}{200}\right)$ ✓

(D) $\left(\frac{(87)(109)}{200}\right)$

(E) $\left(\frac{(97)(91)}{200}\right)$

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Answer C

Correct. The expected count is given by $\frac{(\text{row total})(\text{column total})}{\text{table total}}$. The row total is 87, the column total is 91, and the table total is 200.