Statistics for Two Categorical Variables Quiz

1. The following data were collected from a random sample of people, who identified their favorite type of juice. The results are shown in the following two-way table.

	Orange	Grape	Cranberry	Apple	Total
Adults	600	500	50	150	1,300
Children	400	100	50	150	700
Total	1,000	600	100	300	2,000

What proportion of the children identified orange as their favorite type of juice?

(A) $\frac{400}{1,000}$

(B) $\frac{400}{700}$ ✓

(C) $\frac{400}{2,000}$

(D) $\frac{600}{1,300}$

(E) $\frac{1,000}{2,000}$

Answer B

Correct. There are 700 children, and 400 of the 700 children identified orange as their favorite type of juice, so $\frac{400}{700}$ is the proportion of children who identified orange as their favorite type of juice.

2. The following data were collected from a random sample of people on their favorite types of leisure activities and their age. The results are shown in the two-way table below.

	Reading	Exercise	Playing Video Games	Watching Television	Total
0 to 6 years	10	50	100	140	300
7 to 12 years	200	300	200	200	900
13 to 18 years	600	500	100	100	1,300
19 years or greater	500	250	50	200	1,000
Total	1,310	1,100	450	640	3,500

What proportion of the people aged 7 to 18 years gave watching television as their favorite type of leisure activity?

Statistics for Two Categorical Variables Quiz

(A) $\frac{300}{2,200}$ ✓

(B) $\frac{200}{900}$

(C) $\frac{100}{1,300}$

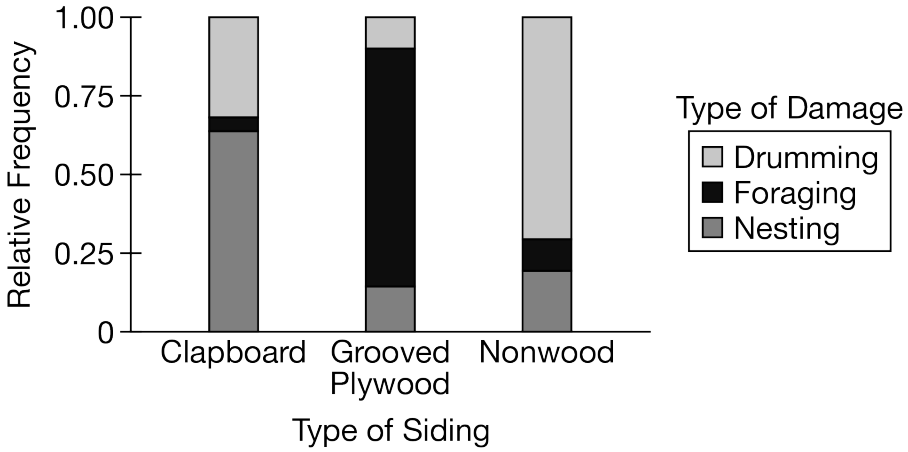
(D) $\frac{640}{3,500}$

(E) $\frac{300}{640}$

Answer A

Correct. There are $900 + 1,300 = 2,200$ people aged 7 to 18 years. 200 of those aged 7 to 12 years and 100 of those aged 13 to 18 years gave watching television as their favorite leisure activity, so $200 + 100 = 300$ of the people aged 7 to 18 years gave watching television as their favorite leisure activity. Thus the proportion of people aged 7 to 18 years who gave watching television as their favorite leisure activity is $\frac{300}{2,200}$.

3. A study was conducted on three types of home siding and the type of damage done to the siding by woodpeckers. Each hole made by a woodpecker was classified as either drumming (territorial signaling), foresting (looking for food), or nesting. The following bar chart shows the relative frequency of the holes for each type of siding.



Which of the following statements is supported by the bar chart?

(A) The proportion of holes created for drumming is the same for all three siding types.

(B) The proportion of holes created for drumming is greatest for grooved plywood.

(C) The proportion of holes created for drumming is least for grooved plywood. ✓

(D) The number of holes created for drumming is least for grooved plywood.

(E) The number of holes created for drumming is greatest for nonwood.

Statistics for Two Categorical Variables Quiz

Answer C

Correct. The proportion of holes created by woodpeckers for drumming is around 30% for clapboard, 10% for grooved plywood, and 70% for nonwood. Therefore, the proportion of holes created for drumming is least for grooved plywood.

4. A penalty kick in soccer involves two players from different teams, the shooter and the goalie. During the penalty kick the shooter will try to score a goal by kicking a soccer ball to the left or right of the goal area. To prevent the shooter from scoring a goal, the goalie will move to the left or right of the goal area. The following table summarizes the directions taken by the shooter and the goalie for 372 penalty kicks.

		Shooter		
		Kick Left	**Kick Right**	**Total**
Goalie	**Move Left**	80	132	212
	Move Right	85	75	160
	Total	165	207	372

Which of the following indicates an association between the shooter's choice of direction and the goalie's choice of direction?

(A) The marginal relative frequencies for the shooter and the goalie are equal.

(B) The marginal relative frequencies for the shooter and the goalie are not equal.

(C) The row totals are not equal.

(D) For the goalie, the relative frequency of a direction is equal to the relative frequency conditioned on the shooter's direction.

(E) For the goalie, the relative frequency of a direction is not equal to the relative frequency conditioned on the shooter's direction. ✓

Answer E

Correct. The goalie moved left 212 times, giving a relative frequency of $\frac{212}{372} \approx 0.57$. If there were no association, the relative frequency of moving left conditioned on the direction of the shooter should be very close 0.57. However, $\frac{80}{165} \approx 0.48$ and $\frac{132}{207} \approx 0.64$. It is likely that there is an association between the two variables.

Statistics for Two Categorical Variables Quiz

5. The following table shows data that were collected from a random sample of people, who indicated their age and their favorite sporting event to watch on television.

	Football	Basketball	Baseball	Soccer	Total
0 to 6 years	10	50	100	140	300
7 to 12 years	200	300	200	200	900
13 to 18 years	600	500	100	100	1,300
19 years and older	500	250	50	200	1,000
Total	1,310	1,100	450	640	3,500

Based on the results above, what proportion of the randomly sampled people are over age 12 years?

(A) $\frac{900}{3,500}$

(B) $\frac{1,300}{3,500}$

(C) $\frac{1,200}{3,500}$

(D) $\frac{2,300}{3,500}$ ✓

(E) $\frac{1,000}{3,500}$

Answer D

Correct. There are 1,300 people aged 13 to 18 years and 1,000 people aged 19 years and older, so there are $1,300 + 1,000 = 2,300$ people in the sample who are over age 12. The proportion of people over age 12 in the sample is $\frac{2,300}{3,500}$.

6. A split ticket is a voting pattern in which a voter casts votes for candidates from more than one political party. In a recent study, 1,000 men and women were asked whether they voted a split ticket in the last election. The totals are shown in the following table.

	Men	Women	Total
Yes, split ticket	a	b	600
No, did not split ticket	c	d	400
Total	800	200	1,000

What value of a would indicate no association between gender and voting pattern for the people in the sample?

Statistics for Two Categorical Variables Quiz

(A) 300
(B) 400
(C) 480 ✓
(D) 500
(E) 800

Answer C

Correct. If no association exists, the proportion of men in the sample, $\frac{800}{1{,}000} = 0.8$, is equal to the proportion of split ticket voters who are men, $0.8(600) = 480$.