Conditional Probability Quiz

1. One student from a high school will be selected at random. Let A be the event that the selected student is a student athlete, and let B be the event that the selected student drives to school. If $P(A \cap B) = 0.08$ and $P(B|A) = 0.25$, what is the probability that the selected student will be a student athlete?

(A) 0.02

(B) 0.17

(C) 0.32 ✓

(D) 0.33

(E) 3.13

Answer C

Correct. By the multiplication rule, $P(A \cap B) = P(A) \cdot P(B|A)$, so $0.08 = P(A) \cdot 0.25$. Solving for $P(A)$ gives 0.32.

2. The seniors at three high schools were surveyed about their plans after graduation. The following table shows the responses, classified by high school.

	Work	Military	College	Undecided	Total
High School A	99	49	138	63	349
High School B	62	26	156	54	298
High School C	83	31	124	71	309
Total	244	106	418	188	956

One senior from the high schools will be selected at random. What is the probability that the senior selected will not be from High School B given that the senior responded with a choice other than college?

(A) $\frac{156}{418}$

(B) $\frac{538}{956}$

(C) $\frac{262}{418}$

(D) $\frac{658}{956}$

(E) $\frac{396}{538}$ ✓

Answer E

Correct. There were $956 - 418 = 538$ seniors who gave a response other than college. Of those,

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$99 + 49 + 63 = 211$ were from High School A and $83 + 31 + 71 = 185$ were from High School C. Thus $\frac{211+185}{538} = \frac{396}{538}$ is the probability that a senior selected will not be from High School B given that the senior gave a response other than college.

3. Students at a local elementary school were shown a painting and asked which emotion—joy, happiness, love, or anger—they felt by looking at the painting. The students were classified by their age. The following table summarizes the responses of the students by age-group.

	Joy	Happiness	Love	Anger	Total
6 to 8 years	28	20	40	18	106
9 to 11 years	61	25	80	60	226
Total	89	45	120	78	332

One student from the school will be selected at random. What is the probability that the student is in the age-group of 6 to 8 years given that the selected student responded joy?

(A) $\frac{89}{332}$

(B) $\frac{28}{332}$

(C) $\frac{28}{106}$

(D) $\frac{106}{332}$

(E) $\frac{28}{89}$ ✓

Answer E

Correct. Of the 89 students who responded joy, 28 were in the age-group of 6 to 8 years, so $\frac{28}{89}$ is the probability that a student will be in the age-group of 6 to 8 years given that the student responded joy.