

AP Statistics - Conditional Probability and Independence - Quiz

Common Core AP STAT 4.5, AP STAT 4.6, HSS-CP.A.2, HSS-CP.A.3, HSS-CP.A.4, HSS-CP.B.6, HSS-CP.B.8 · maths-pdf.fr/en/

Name: _____ Class: _____ Date: ____/____/____

Ten multiple-choice questions test the language of conditioning and independence. Read each explanation to see how the denominator changes with the given event.

AP Statistics · Common Core State Standards: **AP STAT 4.5, AP STAT 4.6, HSS-CP.A.2, HSS-CP.A.3, HSS-CP.A.4, HSS-CP.B.6, HSS-CP.B.8**

Questions

Question 1

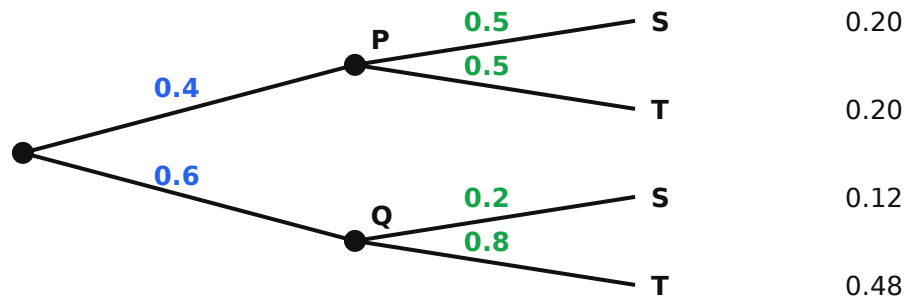
	X	Y	Total
A	20	10	30
B	30	40	70
Total	50	50	100

Two-way table.

What is $P(A | Y)$?

- A. 0.4
- B. 0.5
- C. 0.1
- D. 0.2

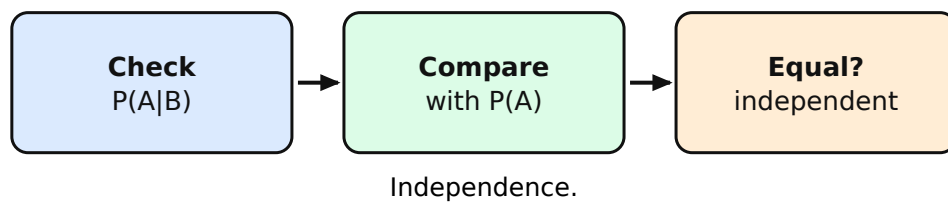
Question 2



What is $P(S)$?

- A. 0.32
- B. 0.5
- C. 0.7
- D. 0.2

Question 3



If $P(A | B) = P(A)$, the events are:

- A. mutually exclusive
- B. independent
- C. complements
- D. the same

Question 4

If A and B are independent with $P(A) = 0.5$ and $P(B) = 0.4$, then $P(A \text{ and } B) =$

- A. 0.2
- B. 0.9
- C. 0.1
- D. 0.45

Question 5

A and B are mutually exclusive and $P(A) > 0$, $P(B) > 0$. They are:

- A. independent
- B. complements

- C. dependent
- D. equally likely

Question 6

$P(A \text{ and } B) = 0.12$ and $P(B) = 0.4$. $P(A | B) =$

- A. 0.048
- B. 0.12
- C. 0.52
- D. 0.3

Question 7

Two cards are drawn without replacement. $P(\text{both aces}) =$

- A. $1/169$
- B. $1/221$
- C. $4/52$
- D. $1/13$

Question 8

$P(A) = 0.6$, $P(B) = 0.5$, and A, B are independent. $P(A \text{ or } B) =$

- A. 1.1
- B. 0.8
- C. 0.3
- D. 0.9

Question 9

The probability of passing a quiz is 0.7. Of passing both of two independent quizzes is:

- A. 1.4
- B. 0.7
- C. 0.49
- D. 0.14

Question 10

$P(+ | \text{disease}) = 0.99$ does NOT mean:

- A. that $P(\text{disease} | +) = 0.99$
- B. that the test detects most cases
- C. the test has high sensitivity
- D. that a sick person tests positive often

Answers

1. **D** - Y has $10 + 40 = 50$ individuals and 10 are in A, so $10/50 = 0.2$.
2. **A** - $P(S) = 0.4(0.5) + 0.6(0.2) = 0.20 + 0.12 = 0.32$.
3. **B** - Knowing B does not change the probability of A.
4. **A** - Multiply for independent events: 0.5×0.4 .
5. **C** - If A occurs then B cannot, so $P(B | A) = 0$, which is not $P(B)$.
6. **D** - $P(A | B) = 0.12/0.4 = 0.3$.
7. **B** - $(4/52)(3/51) = 12/2652 = 1/221$. Using 4/52 twice assumes replacement.
8. **B** - $0.6 + 0.5 - 0.3 = 0.8$.
9. **C** - $0.7 \times 0.7 = 0.49$.
10. **A** - The two conditional probabilities answer different questions and depend on the base rate.

Remember

- $P(A | B) = P(A \text{ and } B) / P(B)$: restrict to the outcomes where B occurred.
- General multiplication rule: $P(A \text{ and } B) = P(B) P(A | B)$.
- Independent: $P(A | B) = P(A)$, so $P(A \text{ and } B) = P(A) P(B)$.
- Mutually exclusive events with positive probabilities are never independent.
- Tree diagrams multiply along branches and add the paths that fit the event.