5.3 Conditional Probability From Tables

$\boxed{\text{Old}}$ Compound Probability

Let's consider a deck of cards: 52 cards, 4 suits, 13 cards in suits.

① What's the probability that Michael will select 2 kings without replacement?

$$P(\text{king}) \cap P(\text{king}) = P(\text{king}) * P(\text{King}) = \frac{4}{52} * \frac{4}{52} = \frac{1}{169} = .005$$

.5%

② What's the probability that Mya will select a king or a queen with replacement?

$$P(\text{king}) \cup P(\text{Queen}) = P(\text{King}) + P(\text{Queen}) = \frac{4}{52} + \frac{4}{51} = \frac{103}{663} \approx .16$$

16%

③ What's the probability that Jordan will draw a spade and then a Jack?

$$P(\text{Spade}) \cap P(\text{Jack}) = P(\text{Spade}) * P(\text{Jack}) = \frac{13}{52} * \frac{(4-1)}{(52-1)} = \frac{13}{52} * \frac{3}{51} = \frac{1}{68} \approx .02$$

2%

$\boxed{\text{new}}$ Conditional Probability

- Conditional Probability – contains a condition that restricts (or limits) the sample space for an event.

<u>notation</u> $P(A|B) \Rightarrow$ "The probability of event A, given event B occurs"

Basically you are narrowing your possibilities only to "B" & out of those "B" possibility find out how many "A" there are actually is.

Let's consider the table showing the results of a survey, "Do you own a pet?"

	Yes	No
Female	8	6
Male	5	7

[Examples] Find the probabilities.

① P(own a pet | female) = out of 14 females, 8 own a pet.

$$= \frac{8}{14} \approx .57 \qquad 57\%$$

② P(female | own a pet) = out of 13 pet owners, 8 are a females

$$= \frac{8}{13} \approx .62 \qquad 62\%$$

[Example3] The table shows the results of a class survey, "Do you wash the dishes last night?"

	Yes	No
Female	7	6
Male	7	8

ⓐ What's the probability that a student washed dishes given the student is male?

P(washed dishes | male) = out of 15 males, 7 washed dishes.

$= \frac{7}{15} \approx .4\bar{6} = 46.6\%$

ⓑ P(female | washed dishes) = out of 14 students who washed dishes, 7 were female

$= \frac{7}{14} = \frac{1}{2} = .5$ 50%

* Remember — Joint Frequencies!

For word problems... use formula

$$P(A|B) = \frac{P(A) \cap P(B)}{P(B)} = \frac{P(A) * P(B)}{P(B)}$$

[Example] At Lithia Springs, the probability that a student takes environmental science & geography is 0.25. The probability that takes environment science is 0.72. What is the probability that a student takes geography given that the student is taking environmental science?

$$P(\text{geography} | \text{environment science}) = \frac{P(\text{geography}) \cap P(\text{environmental science})}{P(\text{environmental science})}$$

$$= \frac{0.25}{0.75} = .\overline{33} \approx \underline{33}.3\%$$