

## 9-6 Properties of Probability

1. You draw 2 cards from the deck of 52 **without replacing** the first card before you draw the second. What is the probability that both cards will be red?

$$\frac{26}{52} * \frac{25}{51} = \frac{650}{2652} = \boxed{\frac{25}{102}}$$

2. You draw 2 cards from the deck and **replace** the first card before you draw the second. What is the probability that both cards will be red?

$$\frac{26}{52} * \frac{26}{52} = \boxed{\frac{1}{4}}$$

### Intersection of Events

$P(A \text{ and } B) = P(A \cap B) = P(A) \cdot P(B|A)$  if two events are dependent (do not replace)

$P(A \text{ and } B) = P(A \cap B) = P(A) \cdot P(B)$  if two events are independent

3. A cookie container has 10 chocolate chip cookies, 11 macadamia nut, 12 oatmeal and 7 oatmeal-chocolate. If you select 1 cookie at random, what is the probability:

- a) it will be contain oatmeal or chocolate?

$$\frac{19}{40} + \frac{17}{40} - \frac{7}{40} = \boxed{\frac{29}{40}}$$

- b) it will be macadamia or chocolate chip?

\* no intersection (overlaps)

$$\frac{11}{40} + \frac{10}{40} = \boxed{\frac{21}{40}}$$

### Union of Events

$P(A \text{ or } B) = P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$P(A \text{ or } B) = P(A \cup B) = P(A) + P(B)$  if two events have no intersection

4. Calvin and Phoebe volunteer in the children's ward of a hospital. The probability that Calvin gets mumps as the result of a visit is  $P(C) = 13\%$  and the probability that Phoebe gets mumps is  $P(Ph) = 7\%$ . Find the probability of each event.

a) Both catch mumps  $.13 * .07 = \boxed{.0091 \text{ or } .91\%}$

b) Calvin does not catch mumps  $1 - .13 = \boxed{.87 \text{ or } 87\%}$

c) Phoebe does not catch mumps  $1 - .07 = \boxed{.93 \text{ or } 93\%}$

d) Neither Calvin nor Phoebe catches mumps  
not Calvin & not Phoebe

$$.87 * .93 = .8091 \text{ or } 80.91\%$$

e) At least one of them catches mumps

	C no P	.13 * .93	.1209	} add	.1909
or	P no C	.07 * .87	.0609		
or	C and P	.0091	.0091		

NOT BOTH CATCH

$$1 - .8091 = .1909$$

or  
19.09%

### Complementary Events

The probability that event A will not occur is  $P(\text{not } A) = 1 - P(A)$

5. Drew has these probabilities of passing various classes: Physics 90%, PreCalc 95%, and Spanish 80%. Find the probability of each event.

a) Passing all three

$$.9 * .95 * .8 = .684 \text{ or } 68.4\%$$

b) failing all three

$$.10 * .05 * .2 = .001 \text{ or } 0.1\%$$

c) passing at least one

NOT FAILING ALL

$$1 - .001 = .999 \text{ or } 99.9\%$$

d) passing exactly one

Physics (not PC or S) =  
or PC (not Ph or S) =  
or S (not PC or Ph) =