

Probability =  $\frac{\text{desired Outcome}}{\text{total possibilities}}$  12-3 Probability  
 $0 < P < 100\%$   
 $0 < P < 1$   
 it will never happen will Always happen  
 The chance or likelihood that something will happen

Ex1. When two coins are tossed, what is the probability that both are tails?

$\left. \begin{matrix} TT \\ HT \\ TH \\ TT \end{matrix} \right\} 4 \text{ total}$ 
 $\boxed{\frac{1}{4}} = P(\text{Tails, Tails})$

Ex2. Monica has a collection of 32 CDs- 18 R&B and 14 rap. As she is leaving for a trip, she randomly chooses 6 CDs to take with her. What is the probability that she selects 3 R&B and 3 rap?

Order does not matter |  $P(3R\&B, 3rap) = \frac{C(18,3) \cdot C(14,3)}{C(32,6)} = .3277 = (.33)$

Ex3. According to the U.S. National Center for Health Statistics, the chances of a male born in 1990 living to be at least 65 years of age are about 3 in 4. For females the chances are 17 in 20.

Probabilities

A. What are the odds of a male living to be at least 65?

3:1

B. What are the odds of a females living to be at least 65?

17:3

odds  
 Success:Failures  
 Add to get total

Ex4. When three coins are tossed, what is the probability that all three are heads?

$$\left. \begin{array}{l}
 HHH \quad TTH \\
 HHT \quad THH \\
 HTT \quad THT \\
 HTH \quad THT \\
 TTT
 \end{array} \right\} 8 \quad \left| \quad P(HHH) = \frac{1}{8} \quad \left| \quad \text{OR} \quad \frac{\text{Penny}}{2} \cdot \frac{\text{Nickel}}{2} \cdot \frac{\text{dime}}{2} = \frac{1}{8}$$

Ex5. Roman has a collection of 26 books- 16 are fiction and 10 are nonfiction. He randomly chooses 8 books to take with him on vacation. What is the probability that he chooses 4 nonfiction and 4 fiction?

Order does not matter

$$P(4 \text{ non}, 4 \text{ fict}) = \frac{C(10,4) \cdot C(16,4)}{C(26,8)} = .2446 \quad \text{or } 24.4\%$$

Ex6. Using the statistics in Example 3, what are the odds that a male born in 1990 will die before age 65? A female born in 1990?

1:3                      3:17

Homework

19.  $P(2 \text{ male}) = \frac{C(4,2)}{C(11,2)} = .109$

OR  $\frac{4}{11} \cdot \frac{3}{10} = \frac{12}{110} = \frac{6}{55}$  ← Equal

20.  $P(2 \text{ females}) = \frac{C(7,2)}{C(11,2)} = .38$

OR  $\frac{7}{11} \cdot \frac{6}{10} = \frac{42}{110} = \frac{21}{55}$  ← equal

$$21. P(\text{1 of each}) = \frac{\overset{\leftarrow \text{males}}{C(4,1)} \cdot C(7,1)}{C(11,2)} = \frac{28}{55}$$

$$\underline{\text{OR}} \quad \frac{4}{11} \cdot \frac{7}{10} = \frac{28}{110} \times 2 = \boxed{\frac{28}{55}}$$

M then F

$$\frac{7}{10} \cdot \frac{4}{11} = \frac{28}{110}$$

F then M