

Section 12.9

Combinations



Copyright © 2009 Pearson Education, Inc.

Chapter 12 Section 9 - Slide 1

Combination

- A **combination** is a distinct group (or set) of objects without regard to their arrangement.
- The number of combinations possible when r objects are selected from n objects is found by

$${}_n C_r = \frac{n!}{(n-r)!r!}$$



Copyright © 2009 Pearson Education, Inc.

Chapter 12 Section 9 - Slide 2

Combination

$${}_6C_4 =$$

$${}_6C_4 = \frac{6!}{(6-4)!4!}$$

$$= 15$$

$${}_6P_4 =$$

$${}_6P_4 = \frac{6!}{(6-4)!}$$

$$= 360$$



Copyright © 2009 Pearson Education, Inc.

Chapter 12 Section 9 - Slide 3

Example

- A student must select 4 of 7 essay questions to be answered on a test. In how many ways can this selection be made?

$$\begin{aligned} {}_7C_4 &= \frac{7!}{(7-4)!4!} = \frac{7!}{3!4!} \\ &= \frac{7 \cdot \cancel{6} \cdot 5 \cdot \cancel{4} \cdot \cancel{3} \cdot 2 \cdot 1}{\cancel{3} \cdot 2 \cdot 1 \cdot \cancel{4} \cdot \cancel{3} \cdot 2 \cdot 1} = 35 \end{aligned}$$

- There are 35 different ways that 4 of 7 questions can be selected.



Copyright © 2009 Pearson Education, Inc.

Chapter 12 Section 9 - Slide 4

Example

- An ice cream parlor has 20 different flavors. Cynthia orders a banana split and has to select 4 different flavors. How many different selections are possible?

$$\begin{aligned}\text{Ice cream choices} &= {}_{20}C_4 \\ &= 1140\end{aligned}$$



Copyright © 2009 Pearson Education, Inc.

Chapter 12 Section 9 - Slide 5

Example

- Toastline Bakery is testing 5 new wheat breads, 4 bran breads and 3 oat breads. If it plans to market 2 of the wheat breads, 2 of the bran breads and one of the oat breads, how many different combinations are possible?

$$\begin{aligned}\text{Bread choices} &= {}_5C_2 \cdot {}_4C_2 \cdot {}_3C_1 \\ &= 10 \cdot 6 \cdot 3 \\ &= 180\end{aligned}$$



Copyright © 2009 Pearson Education, Inc.

Chapter 12 Section 9 - Slide 6

Example

- At a medical research center, an experimental drug is to be given to 16 people, 8 men and 8 women. If 14 men and 11 women have volunteered to be given the drug, in how many ways can the researcher choose the 16 people to be given the drug?

$$\begin{aligned}\# \text{ of choices} &= {}_{14}C_8 \cdot {}_{11}C_8 \\ &= 495,495\end{aligned}$$



Copyright © 2009 Pearson Education, Inc.

Chapter 12 Section 9 - Slide 7