

12

Ch. 4 - Part 4

- Counting Rules.
- Probabilitiy and Counting Rules.

STAT. 110

جمال السعدي
رياضيات - إحصاء



Ch. 4 Part. 4

Counting Rules

- Fundamental Counting rule:

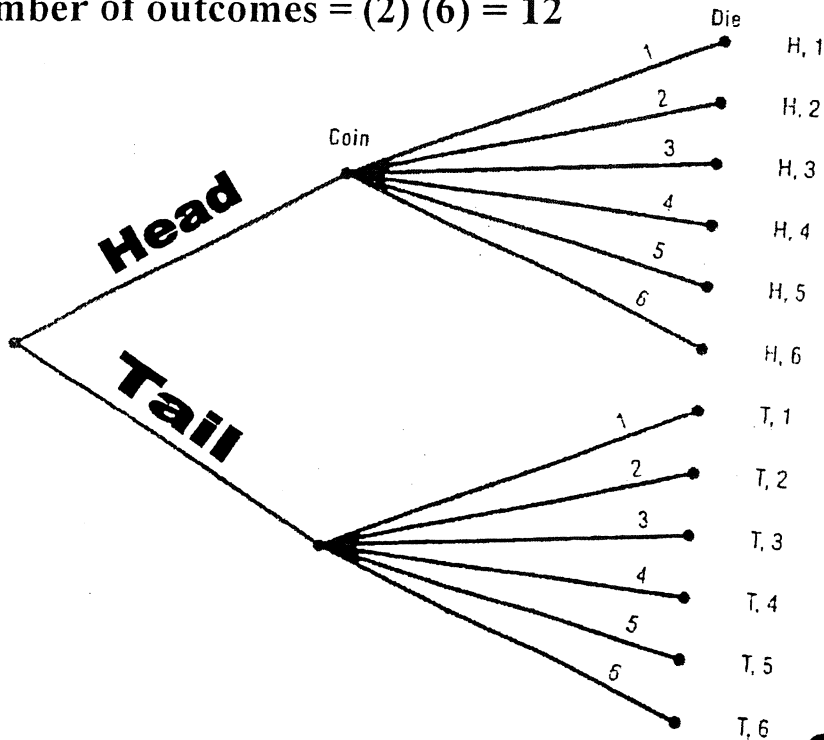
In a sequence of n events in which the first one has k_1 possibilities and the second event has k_2 and the third has k_3 , and so forth, the total number of possibilities of the sequence will be $K_1 \times K_2 \times K_3 \times \dots \times K_n$

Example:

A coin is tossed and a die is rolled. Find the number of outcomes for the sequence of events.

Solution

The number of outcomes = $(2)(6) = 12$



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Example:

The digits 0, 1, 2, 3, and 4 are to be used in a **four-digit** ID card. How many different cards are possible if repetitions are permitted?

5	5	5	5
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Solution

Since there are 4 spaces to fill and 5 choices for each space,

$$\text{The number of cards} = 5 \times 5 \times 5 \times 5 = 5^4 = 625$$

Permutations

A permutation is an arrangement of n objects in a specific order.

Factorial Formulas

For any counting n

$$n! = n \cdot (n - 1) \cdot (n - 2) \cdot \dots \cdot 1$$

$$5! = (5)(4)(3)(2)(1) = 120$$

$$0! = 1$$

Permutation Rule

The arrangement of n objects in a specific order using r objects at a time is called a permutation of n objects taking r objects at a time. It is written as ${}_n P_r$, and the formula is

$${}_n P_r = \frac{n!}{(n - r)!} \quad \bullet \text{ order is important}$$

$${}_5 P_3 = \frac{5!}{(5 - 3)!} = \frac{5!}{2!} = \frac{5 \times 4 \times 3 \times \cancel{2} \times \cancel{1}}{\cancel{2} \times \cancel{1}} = 60$$

ممکن بالآلة بدون الفك

$${}_5 P_5 = \frac{5!}{(5 - 5)!} = \frac{5!}{0!} = \frac{5 \times 4 \times 3 \times \cancel{2} \times \cancel{1}}{\cancel{1}} = 120$$

$$\underline{{}_5 P_5 = 5!}$$

$$\underline{0! = 1}$$

$$\underline{{}_n P_n = n!}$$

Example:

How many different ways can a chairperson and an assistant chairperson be selected for a research project if there are seven scientists available?

Solution

$${}_7P_2 = \frac{7!}{(7-2)!} = \frac{7!}{5!} = 42$$

Example:

A store manager wishes to display 8 different brands of shampoo in a row. How many ways can this be done?

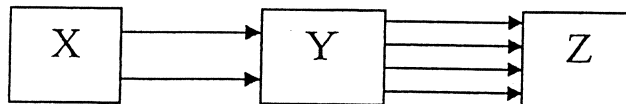
Solution

Numbers of ways

$$= 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 8! = 40320$$

Example:

There are 2 major roads from city X to city Y and 4 major roads from city Y to city Z. How many different trips can be made from city X to city Z passing through city Y?

Solution

$$\text{Numbers of ways} = 2 \times 4 = 8$$

Example:

If 50 tickets are sold and 2 prizes are to be awarded.

Find the probability that one person will win 2 prizes if that person buys 2 tickets.

Solution

التذكرتان x , y

$$P(2 \text{ prizes}) = \left(\begin{array}{c} (x) \\ \downarrow \\ \frac{1}{50} \end{array} \begin{array}{c} \text{ثم} \\ \downarrow \\ \times \end{array} \begin{array}{c} (y) \\ \downarrow \\ \frac{1}{49} \end{array} \right) + \left(\begin{array}{c} (y) \\ \downarrow \\ \frac{1}{50} \end{array} \begin{array}{c} \text{ثم} \\ \downarrow \\ \times \end{array} \begin{array}{c} (x) \\ \downarrow \\ \frac{1}{49} \end{array} \right) = \frac{1}{1225}$$

Combination Rule

The number of combinations of r objects selected from n objects is denoted by ${}_n C_r$ and is given by the formula: ${}_n C_r = \frac{n!}{(n-r)!r!}$

Example:

In a club there are 7 women and 5 men. A committee of 3 women and 2 men is to be chosen.

How many different possibilities are there?

Solution

$${}_7 C_3 \times {}_5 C_2 = \frac{7!}{(7-3)!3!} \times \frac{5!}{(5-2)!2!} = 350$$

How many different tests can be made from a test bank of 20 questions if the test consists of 5 questions?

Solution

$$\text{Number of tests} = 20 C_5 = 15504$$

Example:

There are 7 women and 5 men in a department.

1. How many ways can a committee of 4 people be selected?
2. How many ways can this committee be selected if there must be 2 men and 2 women on the committee?
3. How many ways can this committee be selected if there must be at least 2 women on the committee?

Solution

$$1- \text{ number of committee} = 12 C_4 = 495$$

$$2- \text{ number of committee} = 7 C_2 \times 5 C_2 = 210$$

3- number of committee where at least 2 women

$$\begin{aligned} & (2 \text{ w and } 2 \text{ m}) \text{ or } (3 \text{ w and } 1 \text{ m}) \text{ or } 4 \text{ w} \\ & \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \\ & = (7 C_2 \times 5 C_2) + (7 C_3 \times 5 C_1) + (7 C_4) \\ & = (21 \times 10) + (35 \times 5) + 35 \\ & = 420 \end{aligned}$$

Example:

How many ways can a dinner patron select 3 appetizers and 2 vegetables if there are 6 appetizers and 5 vegetables on the menu?

Solution

$$\begin{aligned} \text{Number of ways} &= \overset{\text{appetizers}}{6} C_3 \times \overset{\text{vegetables}}{5} C_2 \\ &= 20 \times 10 = 200 \end{aligned}$$

Example:

How many different ways can an instructor select 2 textbooks from a possible 17?

Solution

$$\text{Number of ways} = 17 C_2 = 136$$

Example:

A package contains 12 resistors, 3 of which are defective.

If 4 are selected, find the probability of getting

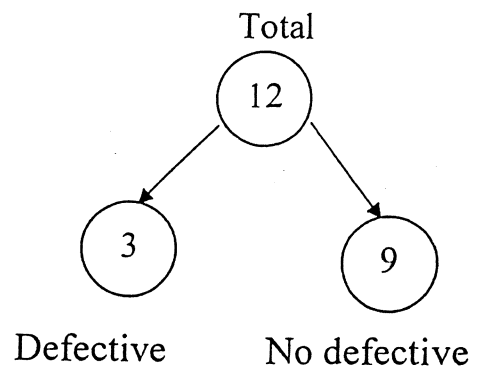
- No defective resistors
- 1 defective resistor
- 3 defective resistors

Solution

$$\text{a. } P(\text{No defective}) = \frac{9 C_4}{12 C_4} = \underline{\underline{0.255}}$$

$$\text{b. } P(\text{1 defective}) = \frac{3 C_1 \times 9 C_3}{12 C_4} = \underline{\underline{0.509}}$$

$$\text{c. } P(\text{3 defective}) = \frac{3 C_3 \times 9 C_1}{12 C_4} = \underline{\underline{0.018}}$$

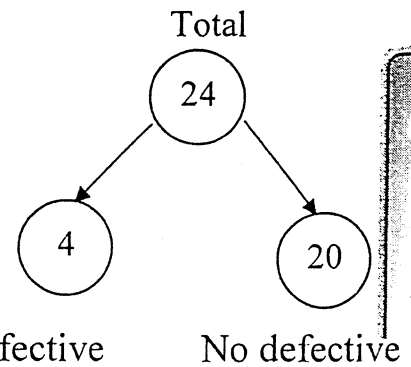


Example:

A box contains 24 transistors, 4 of which are defective.

If 4 are sold at random, find the following probabilities.

- a. Exactly 2 are defective. c. All are defective,
b. None is defective. d. At least 1 is defective.

Solution

a.

$$P(\text{exactly 2 defectives}) = \frac{{}^4C_2 \times {}^{20}C_2}{{}^{24}C_4} = \frac{1140}{10626} = \frac{190}{1771}$$

b.

$$P(\text{no defectives}) = \frac{{}^{20}C_4}{{}^{24}C_4} = \frac{4845}{10626} = \frac{1615}{3542}$$

c.

$$P(\text{all defective}) = \frac{{}^4C_4}{{}^{24}C_4} = \frac{1}{10626}$$

d.

$$P(\text{at least 1 defective}) = 1 - P(\text{no defectives})$$

$$= 1 - \frac{{}^{20}C_4}{{}^{24}C_4} = 1 - \frac{1615}{3542} = \frac{1927}{3542}$$

Example:

A store has 6 TV Graphic magazines and 8 News time magazines on the counter. If two customers purchased a magazine, find the probability that one of each magazine was purchased.

Solution

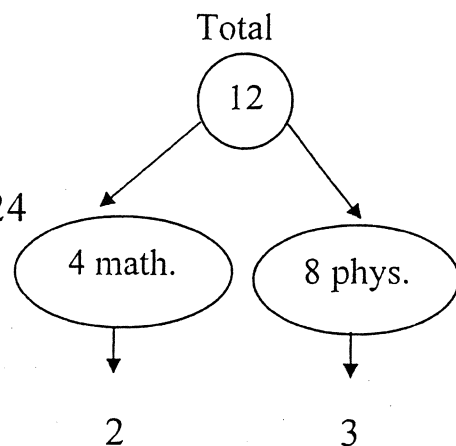
$$P(1 \text{ TV Graphic and } 1 \text{ News time}) = \frac{{}_6C_1 \times {}_8C_1}{{}_{14}C_2} = \frac{6 \times 8}{91} = \frac{48}{91}$$

Example:

Find the probability of randomly selecting 2 mathematics books and 3 physics books from a box containing 4 mathematics books and 8 physics books.

Solution

$$P(2 \text{ math and } 3 \text{ phys.}) = \frac{{}_4C_2 \times {}_8C_3}{{}_{12}C_5} = 0.424$$

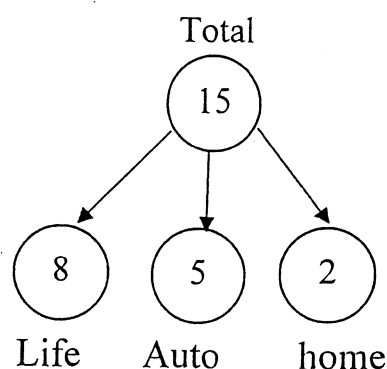


Example:

An insurance sales representative select 3 policies to review. The group of policies she can select from contains 8 life policies, 5 automobile policies, and 2 homeowner policies.

Find the probability of selecting

- All life policies
- Both homeowner policies
- All automobile policies
- 1 of each policy
- 2 life policies and 1 automobile policy

Solution

$$(a) \quad P(\text{All life}) = \frac{8C_3}{15C_3} = 0.123$$

$$(b) \quad P(\text{Both homeowner}) = \frac{2C_2 \times 13C_1}{15C_3} = 0.029$$

$$(c) \quad P(3 \text{ Auto}) = \frac{5C_3}{15C_3} = 0.022$$

$$(d) \quad P(1 \text{ of each policy}) = \frac{8C_1 \times 5C_1 \times 2C_1}{15C_3} = 0.176$$

$$(e) \quad P(2 \text{ life and 1 Auto}) = \frac{8C_2 \times 5C_1}{15C_3} = 0.308$$

Example:

There are 2 math – students and 5 stat – students in a class

How many ways can a group of 3 students be selected if there must be at least one math – student on this group ?

Solution

2 math }
5 stat } Select 3 students

At least 1 math – student

$$\begin{aligned}
 &= (1 \text{ math and } 2 \text{ stat}) \text{ or } (2 \text{ math and } 1 \text{ stat}) \\
 &= (2 C_1 \times 5 C_2) + (2 C_2 \times 5 C_1) \\
 &= 25
 \end{aligned}$$

There are 3 different mathematics courses, 2 different science courses, and one history course. If a student must take one of each, how many different ways can this be done?

- A) 1 B) 6 C) 9 D) 3

When objects are arranged in a specific order, the arrangement is called تبادل
 A) a combination B) with replacement C) without replacement D) a permutation



A store manager wants to display 5 different brands of toothpaste in a row. How many ways can this be done?

- A) 5 B) 20 C) 24 D) 120

$$\text{number of ways} = 5 \times 4 \times 3 \times 2 \times 1 \\ = \boxed{120}$$

In one town, 70% of adults have health insurance. What is the probability that 6 adults selected at random from the town all have health insurance?
 A) 0.086 B) 4.2 C) 0.118 D) 0.7

$$P(\text{All 6 have health insurance}) = (0.70)^6 \\ = 0.117649 \\ = \boxed{0.118}$$

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It is known that 9% of men have a type of color blindness that prevents them from distinguishing between red and green. If 3 men are selected at random, find the probability that all of them will have this type of red-green color blindness.

- A) 0.27 B) 0.07 C) 0.09 D) 0.0007

$$P(\text{blindness}) = 9\% = 0.09$$

$$P(\text{3 men have blindness}) = (0.09)^3 = \boxed{0.0007}$$

How many different ways can 3 tickets be selected from 30 tickets if each ticket wins a different prize?

- A) 6840 B) 4060 C) 1140 D) 24360

تبادل لأنها تذاكر مختلفة السعر
different prize

$${}_{30}P_3 = \boxed{24360}$$

991 ES

$${}_{30}P_3 = 30 \text{ Shift } \times 3 = \boxed{24360}$$

How many different ways can be 3 cars selected from 12 cars?

- A) 36 B) 6 C) 220 D) 1360

الأختيار بدون قيود (أي أنه الترتيب غير مهم)

المسألة توافقية

$$\text{number of diff. ways} = {}_{12}C_3 = \boxed{220}$$

مستطاع رأي الجمهور

A pollster wants to minimize the effect the order of the questions has on a person's response to a survey. How many different surveys are required to cover all possible arrangements if there are 6 questions on the survey?

- A) 120 B) 720 C) 6 D) 36

The number of different ---

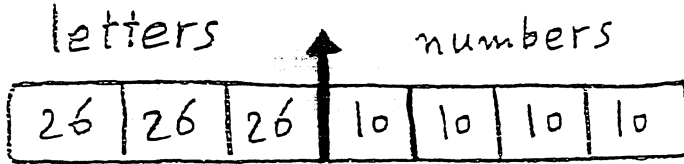
$$= 6 \times 5 \times 4 \times 3 \times 2 \times 1 = \boxed{720}$$

لوحة السيارة

If the 26 alphabetic letters and the numbers from 0 to 9 is to be used to form a car plate that consists of 3 letters and 4 numbers, how many different plates are possible if repetitions are permitted?

- A) 611531 B) 447174 C) 786240 D) 175760000

لأن التكرار مسموح



→ number of plates

$$= 26 \times 26 \times 26 \times 10 \times 10 \times 10 \times 10$$

بالآلة

$$= \boxed{175760000}$$

How many different ways can 4 tickets be selected from 10 tickets if each ticket wins a different prize?

- A) 270 B) 720 C) 5040 D) 120

The number of different ways

$$= 10 P_4 = 5040$$

$$\text{بالآلة} \quad 10 \text{ shift} \times 4 = 5040$$

Model \rightarrow fx-991ES \rightarrow نوع الآلة المستخدمة
 كاسيو

6 خانات

If the letters A,B,C,D,E, and F are to be used in a letter code consists of six digits, how many different codes are possible if the first letter must be A and repetitions are not permitted?

A) 720

B) 1440

C) 46656

D) 120

التكرار غير مسموح

A B C D E F



الحرف الأول يجب
أنه يكون A

عدد طرق اختيار الحرف الأول هو ١

1	5	4	3	2	1
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The number of diff. codes
= $1 \times 5 \times 4 \times 3 \times 2 \times 1 = 120$

Determine the number of all possible outcomes of guessing the last two digits in a telephone number if repetition of digits is allowed.

A) 30 B) 100 C) 1000 D) 20

The number of all possible outcomes

$$= 10 \times 10 = 100$$

لأنه التكرار مسموح repetition is allowed

لو كان التكرار غير مسموح repetition is not allowed

$$10 \times 9 = 90$$

How many different 4-letter permutations can be formed from the letters in the word *orange*?

- A) 360 B) 840 C) 120 D) 420

Orange

كم عدد التباديل للأحرف أحرف
التي يمكن تكوينها من كلمة orange التي تحتوي طبيعاً على 6 أحرف

$$= 6 P_4 \quad \text{بالأدنى} \quad (i) = 6 \times 5 \times 4 \times 3 = \boxed{360}$$

How many different ways can 3 tickets be selected from 20 tickets if each ticket wins a different prize?

- A) 6840 B) 8000 C) 1140 D) 60

اختيار 3 تذكر من ضمن 20 تذكره بسرعة أنواع مختلفة
تباديل

$$\text{The number of ways} = 20 P_3 \quad \text{بالأدنى} = \boxed{6840}$$

How many different tests can be made from a test bank of 10 questions if the test consists of 3 questions?

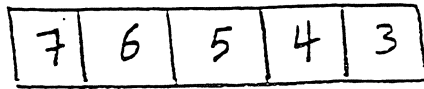
- A) 240 B) 720 C) 120 D) 360

* لم يذكر قيود على الاختيار (أي لا أهمية للترتيب)
في السؤال توابعهم

$$\text{number of tests} = 10 C_3 \quad \text{بالأدنى} = \boxed{120}$$

How many 5-digit numbers can be formed using the digits 1, 2, 3, 4, 5, 6, 7 if repetition of digits is not allowed?

- A) 120
B) 16.807
C) 2520
D) 119



number of digits

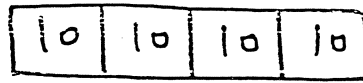
$$= 7 \times 6 \times 5 \times 4 \times 3 = 2520$$

Determine the number of all possible outcomes of guessing the last four digits in a telephone number if repetition of digits is allowed.

- A) 10000 B) 24 C) 5040 D) 210

repetition is allowed

التكرار مسموح

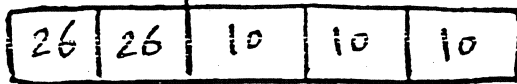


$$= 10 \times 10 \times 10 \times 10 = 10000$$

An ID card consists of 2 letters followed by 3 digits. How many different ID cards can be made if repetitions are allowed?

- A) 650000 B) 486720 C) 468000 D) 676000

الحروف letters
الأرقام digits



$$= 26 \times 26 \times 10 \times 10 \times 10 = 676000$$

A sample of 4 different calculators is randomly selected from a group containing 12 that are defective and 40 that have no defects. What is the probability that at least one of the calculators is defective?

- A) 0.338 B) 0.002 C) 0.662 D) 0.998

$$P(\text{at least one is defective})$$

$$= 1 - P(\text{All no def.})$$

$$= 1 - \frac{{}^{40}C_4}{{}^{52}C_4} = \frac{2759}{4165} \approx \boxed{0.662}$$

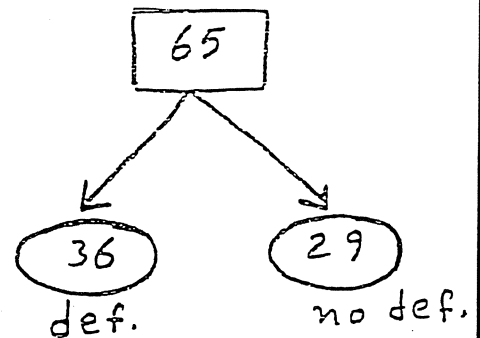
A sample of 4 different calculators is randomly selected from a group containing 36 that are defective and 29 that have no defects. What is the probability that at least one of the calculators is not defective?

- A) 0.965 B) 0.087 C) 0.913 D) 0.035

$$P(\text{at least one } \underline{\text{no def.}})$$

$$= 1 - P(\text{All 4 def.})$$

$$= 1 - \frac{{}^{36}C_4}{{}^{65}C_4} = \frac{5887}{6448} \approx \boxed{0.913}$$



صندوق من مصباح كهربائي

A bin contains 78 light bulbs of which 4 are defective. If 5 light bulbs are randomly selected from the bin, find the probability that all the bulbs selected are good ones.

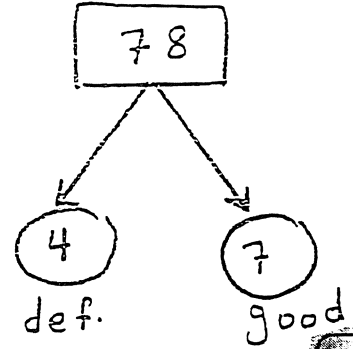
A) 0.763 B) 0.769 C) 0.051 D) 0.949

العدد المختار 5

$P(\text{all good})$

$$= \frac{{}^{74}C_5}{{}^{78}C_5} \quad \text{بالإله}$$

$$= \boxed{0.763}$$



اربع اشخاص

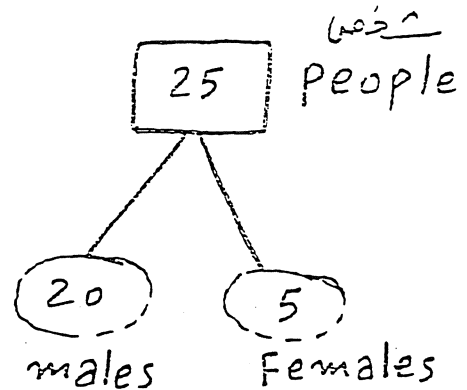
A committee consisting of 4 people is to be formed from 20 males and 5 females. Find the probability that the committee will consist of males only.

A) 0.150 B) 0.791 C) 0.383 D) 0.451

اللجنة تتكون من أربع اشخاص
كلهم ذكور

$$\therefore P = \frac{{}^{20}C_4}{{}^{25}C_4} \quad \text{بالإله}$$

$$= \boxed{0.383}$$



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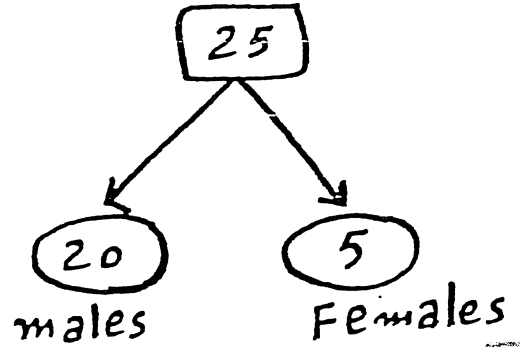
A committee consisting of 8 people is to be formed from 20 males and 5 females. Find the probability that the committee will consist of males only.

- A) 0.116 B) 0.292 C) 0.161 D) 0.219

العدد المختار، 8

$P(\text{All 8 males only})$

$$= \frac{{}^{20}C_8}{{}^{25}C_8} \approx \boxed{0.116}$$

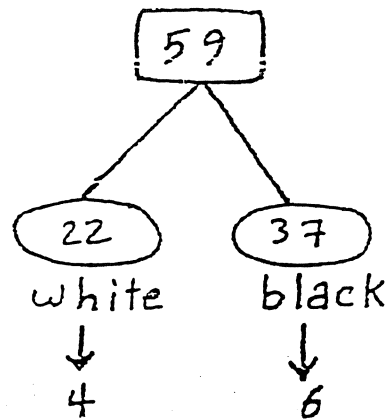


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A bag contains 22 white marbles and 37 black marbles. The probability $P(X)$ of selecting without replacement a sample of size 10 consists of 4 white marbles and 6 black marbles is

- A) $\{ {}^{22}C_4 \times {}^{37}C_6 \} / {}^{59}C_{10}$ B) $\{ {}^6C_4 \times {}^{37}C_{22} \} / {}^{59}C_{10}$ C) ${}^{59}C_{10} / \{ {}^{22}C_4 \times {}^{37}C_6 \}$ D) ${}^{59}C_{10}$

$$P(X) = \frac{{}^{22}C_4 \times {}^{37}C_6}{{}^{59}C_{10}}$$



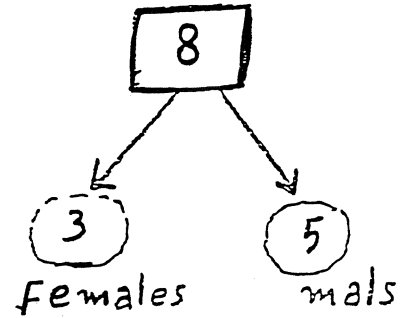
Given eight students, three of which are females. If two students are selected at random, what is the probability that both students are female?

- A) $9/56$ B) $3/32$ C) $3/28$ D) 3

اختيار اثنين

$$P = \frac{{}^3C_2}{{}^8C_2} = \frac{3}{28}$$

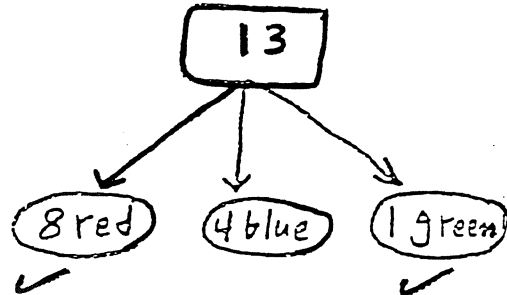
بالذلة



A bag contains 8 red marbles, 4 blue marbles, and 1 green marble. Find $P(\text{not blue})$.

- A) $\frac{9}{13}$ B) 9 C) $\frac{13}{9}$ D) $\frac{4}{13}$

$$P(\text{not blue}) = \frac{{}^9C_1}{{}^{13}C_1} = \frac{9}{13}$$

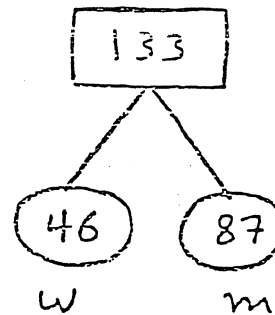


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A class consists of 46 women and 87 men. If a student is randomly selected, what is the probability that the student is a woman?

- A) $\frac{1}{133}$ B) $\frac{46}{133}$ C) $\frac{87}{133}$ D) $\frac{46}{87}$

$$P(w) = \frac{46C_1}{133C_1} = \frac{46}{133}$$



Use the following to answer questions

الدرجات المتفحة

The table below shows the number of earned degrees in the year 2008 in a university by level and gender. A person who earned a degree in the year 2008 from this university is randomly selected. Find the probability of selecting someone who

		Male	Female
Level of Degree	Bachelor's	300	200
	Master's	35	15

earned a master's degree or is a female
 A) 0.7 B) 0.45 C) 0.64 D) 0.48

$$\begin{aligned}
 &P(\text{master's or female}) \\
 &= P(\text{master's}) + P(\text{female}) - P(\text{master's and female}) \\
 &= \frac{50}{550} + \frac{215}{550} - \frac{15}{550} = 0.4545454545454545 = \underline{\underline{0.45}}
 \end{aligned}$$

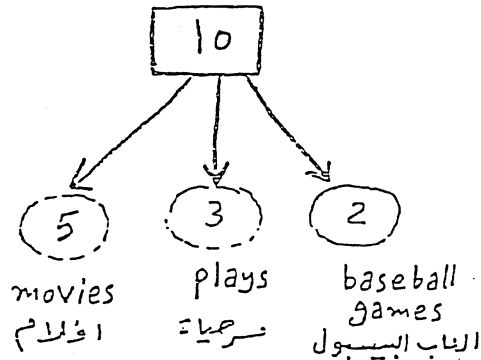
is a female given that the person earned a bachelor's degree.
 A) 0.4 B) 0.67 C) 0.36 D) 0.6

$$P(F/bach.) = \frac{P(F \cap bach.)}{P(bach.)} = \frac{\frac{200}{550}}{\frac{500}{550}} = \frac{200}{500} = \underline{\underline{0.4}}$$

A newspaper advertises 5 different movies, 3 plays, and 2 baseball games for the weekend. If a couple selects 3 activities, find the probability that they attend 2 plays and 1 movie.

- A) 0.20 B) 0.021 C) 0.083 D) 0.125

العدد المختار 3



$$\begin{aligned}
 P(2 \text{ plays and } 1 \text{ movie}) &= \frac{{}^3C_2 \times {}^5C_1}{{}^{10}C_3} \quad \underline{\underline{\text{بالأد}}} \\
 &= \underline{\underline{0.125}}
 \end{aligned}$$

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حدد
It has been found that 6% of all automobiles on the road have defective brakes. If 5 automobiles are stopped and checked by the state police, find the probability that at least one will have defective brakes.

- A) 0.0127 B) 0.266 C) 0.734 D) .9872

نسخة هذه الأنواع من القارص التي تشمل على
نسبة مئوية + عدد + at least one
أقل بقانون واحد هو

$$P = 1 - (\text{كامل النسبة})^{\text{العدد}}$$

$$= 1 - (0.94)^5 = \boxed{0.266}$$

الكرة الملوحة
In a batch of 8,000 clock radios 2% are defective. A sample of 12 clock radios is randomly selected without replacement from the 8,000 and tested. The entire batch will be rejected if at least one of those tested is defective. What is the probability that the entire batch will be rejected?
A) 0.785 B) 0.0833 C) 0.0200 D) 0.215

نسخة كل المسائل من هذه النوعيات :
بها علامة (أماره) وهي وجود

نسبة مئوية 2% + عدد 12 + عبارة at least one

أقل بهذا القانون

$$P = 1 - (\text{طرح النسبة من 1})^{\text{العدد}}$$

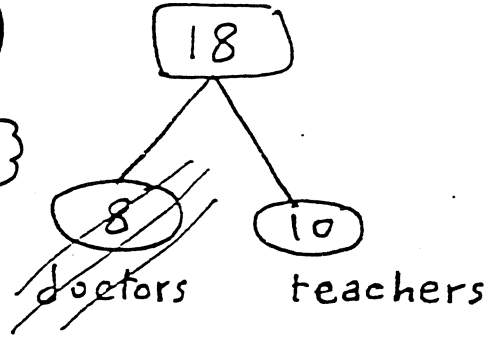
$$= 1 - (0.98)^{12} = \boxed{0.215}$$

A committee of 4 people is to be formed from 8 doctors and 10 teachers. Find the probability that the committee will consist of at least one doctor
 A) 0.93 B) 0.07 C) 0.02 D) 0.98

$P(\text{at least one doctor})$
 تأخذ 4 من الفرح الأخر

$= 1 - \frac{10C_4}{18C_4}$ قانونه المكمل

$= 0.93$



A committee of 4 people is to be formed from 6 doctors and 8 engineers. Find the probability that the committee will consist of at least two doctors.
 A) 0.83 B) 0.17 C) 0.41 D) 0.59

لابد كل اختيار يتكون من أربع أشخاص
 حيث أنه اللجنة تتوى على 4 people

(At least two doctors)

اثنين أطباء أو أكثر
 (2 d. and 2 e.) or (3 d. and 1 e.) or (4 d.)

$$P = \frac{6C_2 \times 8C_2}{14C_4} + \frac{6C_3 \times 8C_1}{14C_4} + \frac{6C_4}{14C_4}$$

$= 0.5944 = 0.59$

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Chapter Quiz

Determine whether each statement is true or false. If the statement is false, explain why.

1. Subjective probability has little use in the real world.
2. Classical probability uses a frequency distribution to compute probabilities.
3. In classical probability, all outcomes in the sample space are equally likely.
4. When two events are not mutually exclusive,
 $P(A \text{ or } B) = P(A) + P(B)$
5. If two events are dependent, they must have the same probability of occurring.
6. An event and its complement can occur at the same time.
7. The arrangement ABC is the same as BAC for combinations.
8. When objects are arranged in a specific order, the arrangement is called a combination.

- c. Guessing at least 1 correct answer
- d. Guessing no incorrect answers
13. When two dice are rolled, the sample space consists of how many events?
a. 6 c. 36
b. 12 d. 54
14. What is nP_0 ?
a. 0 c. n
b. 1 d. It cannot be determined.
15. What is the number of permutations of 6 different objects taken all together?
a. 0 c. 36
b. 1 d. 720
16. What is $0!$?
a. 0 c. Undefined
b. 1 d. 10
17. What is ${}_nC_n$?
a. 0 c. n
b. 1 d. It cannot be determined.

Select the best answer.

9. The probability that an event happens is 0.42. What is the probability that the event won't happen?
a. -0.42 c. 0
b. 0.58 d. 1
10. When a meteorologist says that there is a 30% chance of showers, what type of probability is the person using?
a. Classical c. Subjective
b. Empirical d. b and c are correct
11. The sample space for tossing 3 coins consists of how many outcomes?
a. 2 c. 6
b. 4 d. 8
12. The complement of guessing 5 correct answers on a 5-question true/false exam is
a. Guessing 5 incorrect answers
b. Guessing at least 1 incorrect answer
 $S = \{(5 \text{ inc.}), (1c, 4 \text{ inc}), (2c, 3 \text{ inc}), (3c, 2 \text{ inc}), (4c, \text{inc}), (5c)\}$
A: 5 correct answers
 A' : at least 1 incorrect answers

Complete the following statements with the best answer.

18. The set of all-possible outcomes of a probability experiment is called the *sample space*
19. The probability of an event can be any number between and including 0 and 1
20. If an event cannot occur, its probability is 0
21. The sum of the probabilities of the events in the sample space is 1
22. When two events cannot occur at the same time, they are said to be *mutually exclusive*

راندېن 4 Ch.

كل التمنيان بالنجاح والتوفيق

السعدى