

MA 107 INTERMEDIATE ALGEBRA
-A JUST IN TIME APPROACH-
Statistics Handout: Counting and Probability Practice Test
Sections: 11.1, 11.2, 11.3, 11.4, 11.5.



1. Compute
 - a) ${}_4C_2$
 - b) ${}_nP_0$
2. How many non-repeating three digit numbers can be written using digits from the set $\{3, 4, 5, 6, 7, 8\}$?



3. A retail store stocks windbreaker jackets in small, medium, large, and extra large, and all are available in blue or red. What are the combined choices, and how many combined choices are there? (Hint: use a tree diagram)
4. How many ways can a sample of five CD players be selected from a shipment of twenty-four players?



5. A catering service offers 8 appetizers, 10 main courses, and 7 desserts. A banquet committee is to select 3 appetizers, 4 main courses, and 2 desserts. How many ways can this be done?
6. Jason plays three tennis matches. Use a tree diagram to list the possible win and loss sequences Jason can experience for the set of three matches. W=Win, L = Loss.
7. How many different ways can 9 objects are arranged in order?
8. a) Determine the number of two-digit numbers that can be written using digits from the set $\{1, 2, 3\}$.

b) Determine the number of two-digit numbers that can be written using digits from the set if repetition is not allowed.

9. How many four-digit numbers are there in our system of counting numbers if the first digit must not be zero?



10. In some states, auto license plates have contained three letters followed by three digits. How many different licenses are possible?

11. A nickel and a dime are tossed.

- a) Identify the sample space for this.
- b) Find the probability of observing one tail.
- c) Find the probability of observing at least one head.
- d) Find the probability of observing no tail.



12. A die with 6 sides numbered 1-6 is tossed. Assign a reasonable probability to the following.

- a) Probability of observing a 2?
- b) Probability of observing an odd number?
- c) Probability of observing an even number greater than 3?
- d) Probability of rolling a prime number (2, 3, or 5) ?



13. Mary wants to have three children. Assuming that boy and girl babies are equally likely find the probability that she will have at least two daughters.



14. How many 3-letter code words are possible using the first 8 letters of the alphabet if:

- a) No letter can be repeated?
- b) Letters can be repeated?
- c) Adjacent letters cannot be alike?

15. Given the following probabilities for an even E, find the odds for and against E:
a) $\frac{3}{8}$ b) $\frac{1}{4}$ c) 0.4 d) 0.55

16. Two balls are drawn in succession, without replacement, from a box containing 3 blue balls and 2 white balls.

- a) What is the probability of drawing a white ball on the second draw?
- b) What is the probability of drawing two white balls or two blue balls?
- c) What is the probability of drawing at least one blue ball?

17. **Medicine.** There are 8 standard classifications of blood type. An examination for prospective laboratory technicians consists of having each candidate determine the type for 3 blood samples. How many different examinations can be given if no 2 of the samples provided for the candidate have the same type?

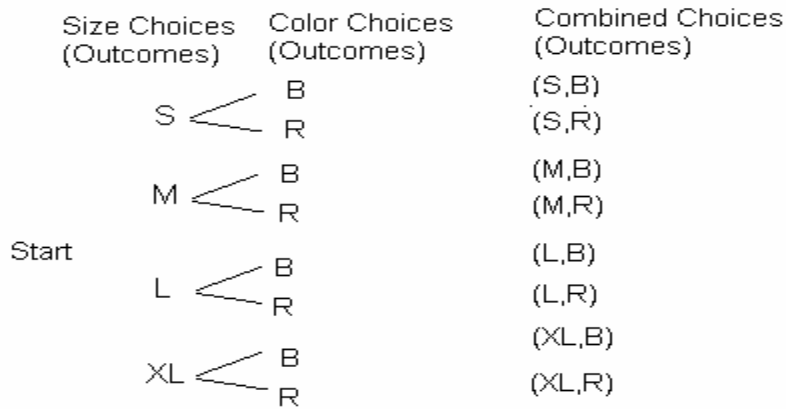
Answers:

1 a) ${}^4C_2 = \frac{4 \times 3 \times 2 \times 1}{(2)2!} = 6$

b) ${}_nP_0 = \frac{n!}{(n-0)!} = \frac{n!}{n!} = 1$

2. $6 \times 5 \times 4 = 120$ Or ${}_6P_3 = 120$

3.

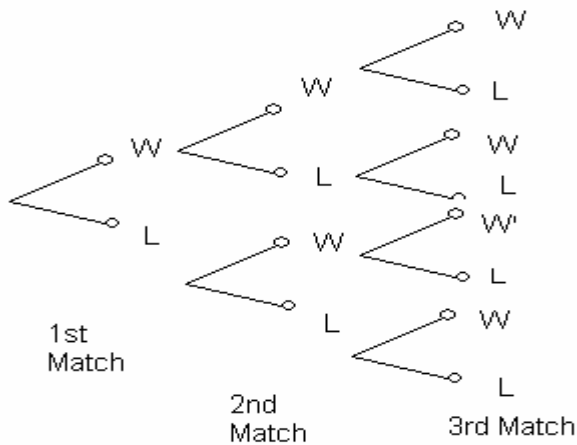


Ans: There are 8 possible combined choices (outcomes).

4. ${}_{24}C_5 = 42,504$

5. $({}^8C_3)({}^{10}C_4)({}^7C_2) = 246,960$

6.



7. $9! = 362,880$ OR ${}_9P_9 = \frac{9!}{(9-9)!} = \frac{9!}{0!} = \frac{9!}{1!} = 362,880$

8a) possible results = $3 \times 3 = 9 = 1,1;1,2;1,3;2,1;2,2;3,2;3,1;3,2;3,3$.

b) possible results = $3 \times 2 = 6$ or ${}_3P_2 = 6$ $1,1;1,2;1,3;2,1;2,2;2,3$;

9. $9 \times 10 \times 10 \times 10 = 9 \times 10^3 = 9000$ possible four digit numbers.

10. $26 \times 26 \times 26 \times 10 \times 10 \times 10 = 26^3 \times 10^3 = 17,576,000$

11a) Sample space = $\{HH, HT, TH, TT\}$; b) Let $e_1 = \text{observing one tail} \rightarrow P(e_1) = 2/4 = 1/2$

c) Let $e_2 = \text{observing at least one head} \rightarrow P(e_2) = 3/4$

d) Let $e_3 = \text{observing no tail} \rightarrow P(e_3) = 1/4$

12a) $P(2) = 1/6$, b) $P(\text{odd number}) = 1/2$, c) $P(\text{even number greater than 3}) = 1/3$,
d) $3/6 = 1/2$

13. Sample space = $\{ggg, ggb, gbg, gbb, bgg, bgb, bgb, bbb\}$

Let $e_1 = \text{at least two daughters} \rightarrow P(e_1) = 4/8 = 1/2$.

14 a) No letter can be repeated? There are ${}_8P_3 = 8 \times 7 \times 6 = 336$ possible code words

b) Letters can be repeated? There are $8^3 = 512$ possible code words

c) Adjacent letters cannot be alike? There are $8 \times 7 \times 7 = 392$ possible code words

15a) $\frac{3}{5}; \frac{5}{3}$ b) $\frac{1}{3}, \frac{3}{1}$ c) $\frac{2}{3}, \frac{3}{2}$ d) $\frac{11}{9}, \frac{9}{11}$

16.

Ans: a) $1/10 + 3/10 = 2/5$, b) $1/10 + 3/10 = 4/10 = 2/5$ Ans: $2/5$,

c) $1 - 1/10 = 9/10$ Ans: $9/10$

17. $8 \times 7 \times 6 = 336$ or ${}_8P_3 = 336$