

SHOW ALL WORK ON THIS TEST OR SEPARATE PAPER. Justify all answers.
REDUCE ALL FRACTIONS AND RATIOS.

1. $5! =$ _____ 2. $0! =$ _____ 3. $\frac{10!}{8!} =$ _____

4. ${}_{10}P_3 =$ _____ 5. $\binom{10}{3} =$ _____
 $\hookrightarrow C(10,3)$ 6. $\binom{10}{7} =$ _____
 $\hookrightarrow C(10,7) =$

7. A club has 8 members. In how many ways can they elect a president, vice pres, and secretary.
8. A club has 8 members. In how many ways can they select three members to attend a conference.
9. In how many ways can the letters "M, A, R, C, H" be arranged if repetition is not permitted?
10. If a man has 6 pair of pants, 4 shirts, and 3 ties, and all of them go together, how many different outfits can be formed?
11. Using the digits 1,2,3,4,5 how many 3 digit numbers can be formed
- A) if repetition is allowed B) if repetition is not allowed
- C) how many even numbers if repetition is allowed? D) how many even numbers if repetition is not allowed?
12. Give a sample space for the experiment of tossing 3 coins.

13. If the probability of winning is .30, find the probability of not winning.
14. A bag contains 6 red, 3 blue, and 1 white ball. If one ball is drawn, find
- A) P(Blue)
- B) P(Not red)
15. If one card is drawn from a regular deck of 52 cards,
- A) P(Ace) B) P(Heart) C) P(Ace or Heart)
16. The probability of rain in Orlando is 0.7 and the probability of rain in New York City is 0.4. Assuming independence, find prob
- A) it rains in both cities B) it does not rain in either city
- C) rains in Orlando and not NYC D) rain in Orlando or NYC
17. An urn contains 4 garnet and 6 gold marbles. If 3 marbles are chosen from the urn, find the probability they are
- A) all garnet B) all gold C) 2 garnet and 1 gold
- D) If 5 marbles are chosen, find the probability 2 will be garnet and 3 will be gold.
18. If the probability of A is $\frac{3}{20}$, find
- A) Odds in favor of A B) Odds against A

MULTIPLE CHOICE:

18. There are 4 chairs arranged in a line on a stage. How many ways can 4 people be seated in these chairs?
- A) 16 B) 256 C) 12 D) 24
19. A club has 6 members. How many 4-member committees can be formed?
- A) 360 B) 30 C) 24 D) 15
20. At a restaurant, a person must select 3 items from column A and 4 choices from column B. If column A has 5 choices and column B has 6 choices, how many different dinner combinations are possible?
- A) 150 B) 25 C) 12 D) 7
21. A group of students consists of 3 freshmen and 5 sophomores. Two students are selected without replacement. What is the probability that both students selected are freshmen?
- A) $9/25$ B) $3/10$ C) $9/64$ D) $3/28$
22. In a study of drivers under the age of 25, 30 wear seat belts and 21 do not. If one driver is chosen at random, what is the probability that he or she does not wear a seat belt?
- A) $17/7$ B) $7/10$ C) $10/17$ D) $7/17$
23. A fitness study involves a sample of 24 females (14 of whom jog) and 18 males (8 of whom jog). If one person is chosen at random, what is the probability that person is a male or a person who jogs?
- A) $20/21$ B) $16/21$ C) $4/9$ D) $11/49$
22. What is the probability that this is the last question on the test?
- A) 0 B) 1 C) None of the above D) All of the above

MULTIPLE CHOICE:

18. There are 4 chairs arranged in a line on a stage. How many ways can 4 people be seated in these chairs?
- A) 16 B) 256 C) 12 D) 24
19. A club has 6 members. How many 4-member committees can be formed?
- A) 360 B) 30 C) 24 D) 15
20. At a restaurant, a person must select 3 items from column A and 4 choices from column B. If column A has 5 choices and column B has 6 choices, how many different dinner combinations are possible?
- A) 150 B) 25 C) 12 D) 7
21. A group of students consists of 3 freshmen and 5 sophomores. Two students are selected without replacement. What is the probability that both students selected are freshmen?
- A) $9/25$ B) $3/10$ C) $9/64$ D) $3/28$
22. In a study of drivers under the age of 25, 30 wear seat belts and 21 do not. If one driver is chosen at random, what is the probability that he or she does not wear a seat belt?
- A) $17/7$ B) $7/10$ C) $10/17$ D) $7/17$
23. A fitness study involves a sample of 24 females (14 of whom jog) and 18 males (8 of whom jog). If one person is chosen at random, what is the probability that person is a male or a person who jogs?
- A) $20/21$ B) $16/21$ C) $4/9$ D) $11/49$
22. What is the probability that this is the last question on the test?
- A) 0 B) 1 C) None of the above D) All of the above

FINITE MATH PROBABILITY B solutions

1. $5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$ 2. $0! = 1$ By def. 3. $\frac{10 \cdot 9 \cdot 8!}{8!} = 90$ 4. ${}_{10}P_3 = \frac{10 \cdot 9 \cdot 8}{1} = 720$

5. $\binom{10}{3} = \frac{10 \cdot 9 \cdot 8}{3 \cdot 2 \cdot 1} = 120$ 6. $\binom{10}{7} = \binom{10}{3} = 120$ 7. ${}_{8}P_3 = \frac{8 \cdot 7 \cdot 6}{1} = 336$ 8. $\binom{8}{3} = \frac{8 \cdot 7 \cdot 6}{3 \cdot 2 \cdot 1} = 56$ 9. $\frac{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{1} = 120$

10. $6 \cdot 4 \cdot 3 = 72$ 11a) $\frac{5 \cdot 5 \cdot 5}{1} = 125$ 12. $\{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT\}$

b) $\frac{5 \cdot 4 \cdot 3}{1} = 60$ 13. $1 - .30 = .70$ 14a) $\frac{3}{10}$
 c) $\frac{5 \cdot 5 \cdot 2}{1} = 50$ b) $\frac{4}{10} = \frac{2}{5}$
 d) $\frac{4 \cdot 3 \cdot 2}{1} = 24$

15a) $P(\text{Ace}) = \frac{4}{52} = \frac{1}{13}$
 b) $P(\text{Heart}) = \frac{13}{52} = \frac{1}{4}$
 c) $P(\text{Ace or heart}) = \frac{4}{52} + \frac{13}{52} - \frac{1}{52} = \frac{16}{52} = \frac{4}{13}$

16. $P(\text{Rain in O}) = .7$ $P(\text{No rain in O}) = .3$
 $P(\text{Rain in NY}) = .4$ $P(\text{No rain in NY}) = .6$
 a) Rain, Rain: $(.7)(.4) = .28$ b) No Rain, No Rain: $(.3)(.6) = .18$
 c) Rain O, No R. NY: $(.7)(.6) = .42$ d) $P(O \text{ or NY}) = P(O) + P(NY) - P(\text{both}) = .7 + .4 - .28 = 1.10 - .28 = .82$

17a) $\frac{\binom{4}{3} \binom{6}{0}}{\binom{10}{3}} = \frac{4 \cdot 1}{120} = \frac{1}{30}$
 (See # 5.)

17b) $\frac{\binom{4}{0} \binom{6}{3}}{\binom{10}{3}} = \frac{1 \cdot \frac{6 \cdot 5 \cdot 4}{3 \cdot 2 \cdot 1}}{120} = \frac{20}{120} = \frac{1}{6}$

17c) $\frac{\binom{4}{2} \binom{6}{1}}{\binom{10}{3}} = \frac{\frac{4 \cdot 3}{2 \cdot 1} \cdot 6}{120} = \frac{36}{120} = \frac{3}{10}$

Shortcut

$\frac{4}{10} \cdot \frac{3}{9} \cdot \frac{2}{8} = \frac{1}{30}$

Shortcut $\frac{1}{10} \cdot \frac{4}{9} \cdot \frac{3}{8} = \frac{1}{6}$

17d) $\frac{\binom{4}{2} \binom{6}{3}}{\binom{10}{5}} = \frac{\frac{4 \cdot 3}{2 \cdot 1} \cdot \frac{6 \cdot 5 \cdot 4}{3 \cdot 2 \cdot 1}}{\frac{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}} = \frac{36}{120} = \frac{3}{10}$

18. $P(A) = \frac{3}{20} = \text{FAV.}$
 $17 = \text{UNFAV.}$

a) Odds in favor = $3 \text{ to } 17$ 18. $4 \cdot 3 \cdot 2 \cdot 1 = 24$ (D)
 b) Odds against = $17 \text{ to } 3$ 19. $\binom{6}{4} = \binom{6}{2} = \frac{6 \cdot 5}{2 \cdot 1} = 15$ (D)

23. $\frac{18 + 14}{42} = \frac{32}{42} = \frac{16}{21}$ (B) 24. (B)

20. $\binom{5}{3} \binom{6}{4} = \binom{5}{2} \binom{6}{2} = \frac{5 \cdot 4}{2 \cdot 1} \cdot \frac{6 \cdot 5}{2 \cdot 1} = 150$ (A)

21. $\frac{3}{4} \cdot \frac{2}{7} = \frac{3}{28}$ (D)

22. $\frac{21}{51} = \frac{7}{17}$ (D)