LAM I Exam PROBABILITY Form X R^2 Name_____

SHOW ALL WORK on this test or on separate paper. Turn in ALL worksheets.
Calculators are allowed on this test.   Circle Answers.

1.   4!   2.   P (6 , 3)   3.   C (6 , 3)

4.   C (20 , 2)   5.   C (20, 18)   6. $\dfrac{6!}{3!}$

7.   How many 4 letter arrangements can be made from the letters **a, e, i, o, u**
       a)   if no letter may be repeated?   b)   if repetition is allowed?

8.   How many 3 digit numbers more than 300 can be formed using the digits **1, 2, 3, 4**
       a)   if no digit may be repeated?   b)   if digits many be repeated?

9.   Eight players try out for a basketball team. How many teams of 5 people could be chosen?

10.   Box 1 contains a red marble and a green marble. Box 2 contains a blue, a red, and a white
        marble. Give a sample space for choosing a box and then choosing a marble from that
        box.

11.   A bag contains 3 red, 10 blue, and 2 white marbles. If one marble is drawn at random, find
        (reduce all fractions!)
        a)   P(Red)   b)   P(Blue)   c)   P(white).

12. If a marble is drawn from the bag in #11, find
    a) P(red or white) b) P(not red)

13. If the probability of rain is 3/10, find the probability it will NOT rain.

14. The formula P(A or B) = P(A) + P(B) assumes that A and B are _____.

15. The formula P(A and B) = P(A) * P(B) assumes that A and B are _____.

16. If probability of rain in Philadelphia is 0.3 and probability of rain in Miami is 0.6, find
    the probability that it will
    a) rain in both Philadelphia and Miami b) not rain in either city

    c) rain only in Philadelphia d) rain in Philadelphia or Miami.

17. The odds in favor of winning a race are 3 to 2.
    a) Find the odds against winning the race. b) Find the probability of winning the race.

18. The probability of A happening is $\dfrac{7}{10}$.
    a) Find the odds in favor of A happening. b) Find the odds against A happening.

19. The odds against A happening are "a" to "b".
    a) Find P(A). b) Find the probability that A will NOT occur.

20. A jar contains 6 red and 4 blue marbles. Two marbles are chosen at random. Find the probability that

a) both are red.   b) both are blue   c) there is one of each

21. A jar contains 3 red, 5 blue, and 2 white marbles. Three are chosen at random. Find the probability that

a) all are blue   b) there are 2 red and 1 blue marbles.

22. a) Define smple space.

b) Give an example of a sample space.

23. Explain the difference between a permutation and a combination.

MULTIPLE CHOICE:
24. For dinner you are to 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?
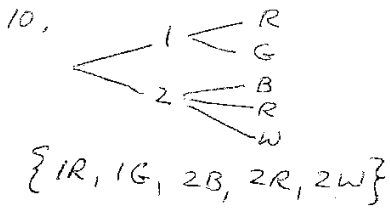
A. 150   B. 25   C. 12   D. 7

25. Five students competed in a poetry contest. After the competition, a $100 first prize, a $50 second prize, and a $20 third prize were awarded. How many different ways can the awards be given?

A. 125   B. 60   C. 12   D. 3

26. A club has 6 members. How many different slates of officers consisting of a president, vice president, and secretary are possible?

A. 216   B. 120   C. 36   D. 18

27. A club has 6 members. How many 4-member committees can be formed?

A. 360   B. 30   C. 24   D. 15

28. A recent survey indicated that ten percent of high school athletes play collegiate sports. Of these, five percent enter professional sports. What is the probability that a randomly selected high school athlete will have both a college and professional career?

A. 0.15   B. 0.05   C. 0.02   D. 0.005

29. 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. 22/21   B. 16/21   C. 4/9   D. 11/49

30. 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

31. Ten percent of the tennis balls manufactured by a company are defective. If two balls are randomly selected with replacement from the day's production, find the probability that both of them are defective.

A. 1/100   B. 1/90   C. 1/10   D. 1/5

LIBERAL ARTS MATH I   Probability Exam X Solutions

1. $4! = \boxed{24}$ 2. $P(6,3) = \boxed{120}$ 3. $C(6,3) = \boxed{20}$ 4. $C(20,2) = \boxed{190}$

5. $C(20,18) = \boxed{190}$ 6. $\dfrac{6!}{3!} = \boxed{120}$ 7a) $\underline{5 \cdot 4 \cdot 3 \cdot 2} \boxed{120}$ 8a) $\underline{2 \cdot 3 \cdot 2} = \boxed{12}$

9. $C(8,5) = \boxed{56}$ b) $\underline{5 \cdot 5 \cdot 5 \cdot 5} = \boxed{625}$ b) $\underline{2 \cdot 4 \cdot 4} = \boxed{32}$

10.
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        R
   1 <
        G
  <
        B
   2 <  R
        W
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$\{1R, 1G, 2B, 2R, 2W\}$

11a) $P(Red) = \dfrac{3}{15} = \boxed{\dfrac{1}{5}}$ 12a) $P(R \text{ or } W) = \dfrac{3+2}{15} = \dfrac{5}{15} = \boxed{\dfrac{1}{3}}$

b) $P(Blue) = \dfrac{10}{15} = \boxed{\dfrac{2}{3}}$ b) $P(not\ Red) = \dfrac{10+2}{15} = \dfrac{12}{15} = \boxed{\dfrac{4}{5}}$

c) $P(White) = \boxed{\dfrac{2}{15}}$ 13. $P(No\ Rain) = 1 - \dfrac{3}{10} = \boxed{\dfrac{7}{10}}$

14. Mutually Exclusive   16. $P(Rain\ Philly) = .3$ $P(Rain\ Miami) = .6$
15. Independant $P(No\ Rain\ Philly) = .7$ $P(No\ Rain\ Miami) = .4$

16a) Rain Philly and Miami.   b) No Rain Philly and no rain Miami.
$.3 \times .6 = \boxed{.18}$ $.7 \times .4 = \boxed{.28}$

17. Odds in favor 3 to 2
   Favorable = 3
   $\dfrac{Unfavor = 2}{Total = 5}$

c) Rain Philly and no rain Miami.   d) Rain Philly or Miami.
$.3 \times .4 = \boxed{.12}$ $= P(Ph) + P(M) - P(overlap)$

a) Odds against =
   unfavor to favorable   18. $P(A) = \dfrac{7}{10}$ $= .3 + .6 - .18$
   $\boxed{2\ to\ 3}$ Favor = 7 $= .90 - .18 = \boxed{.72}$
                              Unfavor = 3
b) Prob of winning   Total = 10   19. Odds against
   $= \dfrac{Favorable}{Total} = \boxed{\dfrac{3}{5}}$ a) odds in favor b) odds against a to b.
                              $\boxed{7\ to\ 3}$ $\boxed{3\ to\ 7}$ Favor = b
                                                          Unfavor = a
                                                          Total = $a+b$.

20a) $\dfrac{C(6,2)\ C(4,0)}{C(10,2)}$ b) $\dfrac{C(6,0)\ C(4,2)}{C(10,2)}$ c) $\dfrac{C(6,1)\ C(4,1)}{C(10,2)}$ a) $P(A) = \boxed{\dfrac{b}{a+b}}$

or $\dfrac{6}{10} \cdot \dfrac{5}{9} = \boxed{\dfrac{1}{3}}$ or $\dfrac{4}{10} \cdot \dfrac{3}{9} = \boxed{\dfrac{2}{15}}$ $= \boxed{\dfrac{8}{15}}$ b) $P(Not\ A) = \boxed{\dfrac{a}{a+b}}$

21a) $\dfrac{C(5,3)\ C(5,0)}{C(10,3)}$ b) $\dfrac{C(3,2)\ C(5,1)\ C(2,0)}{C(10,3)} = \dfrac{3 \cdot 5}{120} = \boxed{\dfrac{1}{8}}$ 22a) Set of all possible outcomes.

or $\dfrac{5}{10} \cdot \dfrac{4}{9} \cdot \dfrac{3}{8} = \boxed{\dfrac{1}{12}}$

b) For die toss:
   $\{1,2,3,4,5,6\}$

23 Permutation: Order is significant   24. $C(5,3) \cdot C(6,4)$ $\{Even, Odd\}$
   Combination: Order does not matter. $10 \cdot 15 = \boxed{150}$ A   Coin Toss = $\{H, T\}$

25. $5 \cdot 4 \cdot 3 = \boxed{60}$ B   29. $P(M \text{ or } Jogs)$ 2 Coin Toss = $\{HH, HT, TH, TT\}$
26. $P(6,3) = \boxed{120}$ B $= P(M) + P(Female\ Jogger)$
27. $C(6,4) = \boxed{15}$ D $= \dfrac{18 + 14}{42} = \dfrac{32}{42} = \boxed{\dfrac{16}{21}}$ B   30. $P(Both\ left) = \dfrac{21}{51} = \boxed{\dfrac{7}{17}}$ D   31. $P(Both\ def.)$
28. $(.10)(.05) = \boxed{.005}$ D $= (.10)(.10)$