1. An experiment consists of tossing two dice and observing the numbers on the top faces. Consider the following events:

   E = both numbers are greater than or equal to 3.
   F = both numbers are less than or equal to 3.
   G = the total of the two numbers is seven or greater
   H = at least one of the numbers is a two.

   Which of the following is a pair of mutually exclusive events?

a. E and G b. F and H c. G and H d. E and F e. F and G

2. If a student is selected at random from a class, there is a probability of exactly $\frac{2}{3}$ that the student likes the music of the Grateful Dead, of exactly $\frac{1}{4}$ that the student likes Bach organ music, and of exactly $\frac{3}{14}$ that the student likes both Bach organ music and the music of the Grateful Dead. Which of the following possible class sizes is compatible with those probabilities?

a. 28 b. 56 c. 84 d. 70 e. 42

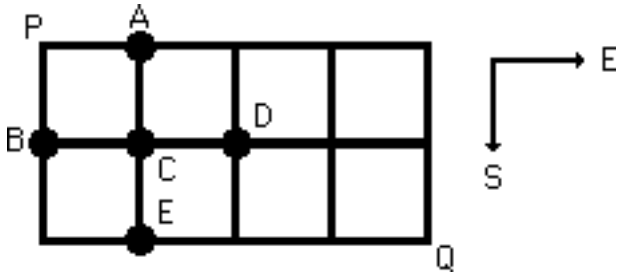
3. A fair coin is tossed 10 times. What is the probability of obtaining exactly 3 heads?

a. $\frac{3}{10}$ b. $\frac{15}{128}$ c. $\frac{1}{8}$ d. $\frac{5}{32}$ e. $\frac{27}{256}$

4. A gambler uses a biased coin for which the odds in favor of coming up heads when tossed are 4:3. What is the probability that the coin will show tails when tossed?

a. $\frac{3}{7}$ b. $\frac{4}{7}$ c. $\frac{3}{4}$ d. $\frac{1}{4}$ e. $\frac{1}{3}$

5. A visiting foreign leader is to travel in a motorcade from an air base P to her hotel at Q. For security reasons, the motorcade is equally likely to take any of the routes from P to Q (traveling always East or South). Which of the five intersections A, B, C, D, or E is the motorcade most likely to pass through?



a. A b. B c. C d. D e. E

6. Independent events E and F have probabilities Pr(E) = .6 and Pr(F) = .5. What is Pr(E $\cup$ F)?

a. 0.7 b. 0.9 c. 0.8 d. 0.6 e. 1

7. Carla and Jose each have 2 nickels and a dime. Carla gives one of her coins at random to Jose, and then Jose gives one of his four coins, at random, to Carla. Carla later finds out she doesn't have enough change to buy a 25 cent bag of sweets. What is the probability that Jose gave Carla a dime?

a. $\frac{1}{3}$ b. $\frac{1}{5}$ c. $\frac{1}{4}$ d. $\frac{1}{2}$ e. $\frac{1}{6}$

8. A packet of mixed nuts contains equal numbers of peanuts, walnuts, pecans and almonds, and half as many pistachios as peanuts. A nut is picked from the packet at random. What is the probability the nut is a pistachio or almond?

a. $\frac{2}{7}$ b. $\frac{2}{5}$ c. $\frac{1}{4}$ d. $\frac{1}{5}$ e. $\frac{1}{3}$

9. Three friends play a game of catch with a ball. Whoever has the ball is equally likely to throw it to either of the other two players. What is the probability that on the third throw the ball will return to the player who threw it first.

a. $\frac{1}{4}$ b. $\frac{1}{3}$ c. $\frac{1}{2}$ d. $\frac{1}{5}$ e. $\frac{1}{6}$

10. What is the probability that of four independently and randomly scheduled meetings in March at least two will occur on the same day?

a. $\frac{P(31,4)}{31^4}$ b. $1 - \frac{P(31,4)}{31^4}$ c. $\frac{C(31,4)}{31^4}$

d. $1 - \frac{C(31,4)}{31^4}$ e. $1 - \frac{C(31,4)}{P(31,4)}$

11. A pair of fair dice is rolled once. What is the probability that both of the dice come up as 5 given that at least one of them came up as a 5?

a. $\frac{1}{9}$ b. $\frac{1}{10}$ c. $\frac{1}{11}$ d. $\frac{1}{8}$ e. $\frac{1}{7}$

12. The table below gives the probability distribution of a random variable X.

k	Pr(X = k)
0	$\frac{1}{5}$
1	$\frac{3}{5}$
2	$\frac{1}{5}$

What is the variance of X?

a. $\frac{4}{5}$ b. $\frac{1}{5}$ c. $\frac{3}{5}$ d. $\frac{2}{5}$ e. 1

13. A fair coin is tossed at most four times, stopping after the first head is obtained. What is the expected value of the number of tosses?

a. $1\frac{7}{8}$ b. $1\frac{3}{4}$ c. $1\frac{3}{8}$ d. $1\frac{1}{4}$ e. 2

14. An instrument in a weather satellite will function correctly provided <u>at least</u> one of two circuits A, B is working. Each circuit A or B contains 100 transistors, which must all function if the circuit is to work. The probability that any particular one of the transistors will fail within five years is 0.002. Assuming that transistor failures are independent events, what is the probability the instrument will function correctly for five years?

a. $1 - (.002)^{200}$ b. $(.998)^{200}$ c. $1 - (1 - (.998)^{100})^2$

d. $1 - (1 - (.998)^2)^{100}$ e. $(1 - (.998)^{100})^2$

15. Six cards are selected randomly without replacement from a standard deck of 52 playing cards. What is the probability that the cards consist of 3 cards of one denomination and 3 cards of a second denomination?

a. $\frac{P(13,2)\ C(4,3)^2}{C(52,6)}$ b. $\frac{C(13,2)\ C(4,3)^2}{C(52,6)}$

c. $\frac{P(13,2)\ P(4,3)^2}{P(52,6)}$

d. $\frac{C(13,2)\ C(8,6)}{C(52,6)}$ e. $\frac{C(4,2)\ C(13,3)^2}{C(52,6)}$

16. The table below gives the probability distribution table for an experiment in which a biased die is rolled once and the number on the top face recorded.

Outcome	1	2	3	4	5	6
Probability	$\frac{1}{16}$	$\frac{3}{16}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{16}$	$\frac{5}{16}$

Consider the following events.

E = {1, 2} F = {1, 2, 4} G = {1, 3, 5} H = {6}.

Which of the following is a pair of independent events.

a. G and H b. E and F c. E and H d. F and H e. E and G

17. A bag contains 2 red balls and 2 green balls. The balls are randomly drawn, one at time, without replacement, until no red balls are left in the bag. Find the probability that exactly 3 balls will be drawn from the bag.

a. $\frac{2}{3}$ b. $\frac{1}{2}$ c. $\frac{1}{3}$ d. $\frac{1}{4}$ e. $\frac{1}{6}$

18. A toy manufacturer makes dolls at factories at Boston, Houston and Los Angeles. 30% of the dolls are manufactured at Boston, and of those, 2% are defective (their ears are too big). 40% of the dolls are made at Houston, and 3% of those are defective. Of the remaining dolls (made in L.A.), 4% are defective. What is the probability that a defective doll was made in Boston?

a. 0.15 b. 0.25 c. 0.3 d. 0.2 e. 0.1

19. A picnic hamper contains 4 apples, 3 oranges and 2 bananas. What is the probability that if 4 pieces of fruit are randomly selected from the hamper, there will be at least one piece of each type?

a. $\frac{4}{9}$ b. $\frac{4}{7}$ c. $\frac{5}{8}$ d. $\frac{8}{35}$ e. $\frac{3}{5}$

20. Two people A, B play a dice game. A single fair die is thrown, and one of them pays the other a number of dollars equal to the number shown on the die. If the number is 1, 3 or 6, A pays the money to B, otherwise B pays the money to A. The game is played 60 times. What are the total expected winnings for player A?

a. \$10 b. \$8 c. \$0 d. – \$8 e. –\$10