

How many distinguishable permutations of letters are possible in the word?

- 1) CRITICS
- 2) GIGGLE

An order of award presentations has been devised for seven people: Jeff, Karen, Lyle, Maria, Norm, Olivia, and Paul.

- 3) In how many ways can the awards alternate between men and women with the first award being presented to a woman?

Four accounting majors, two economics majors, and three marketing majors have interviewed for five different positions with a large company. Find the number of different ways that five of these could be hired.

- 4) Two accounting majors must be hired first, then one economics major, then two marketing majors.
- 5) There is no restriction on the college majors hired for the five positions.

Given a group of students:

$G = \{\text{Allen, Brenda, Chad, Dorothy, Eric}\}$ or

$G = \{A, B, C, D, E\}$, count the different ways of choosing the following officers or representatives for student congress. Assume that no one can hold more than one office.

- 6) A male president and three representatives

Solve the problem.

- 7) A restaurant offered salads with 3 types of dressings and one choice of 5 different toppings. How many different types of salads could be offered?
- 8) How many 3-digit numbers can be formed using the digits 0, 1, 2, 3, 4, 5, 6, if repetitions are not allowed?

- 9) A person ordering a certain model of car can choose any of 5 colors, either manual or automatic transmission, and any of 7 audio systems. How many ways are there to order this model of car?

Suppose a traveler wanted to visit a museum, an art gallery, and the state capitol building. 45-minute tours are offered at each attraction hourly from 10 a.m. through 3 p.m. (6 different hours). Solve the problem, disregarding travel time.

- 10) In how many ways could the traveler schedule all three tours in one day, with the museum tour being after noon?

To win the World Series, a baseball team must win 4 games out of a maximum of 7 games. To solve the problem, list the possible arrangements of losses and wins.

- 11) How many ways are there of winning the World Series in exactly 7 games if the winning team loses the first game?
- 12) How many ways are there of winning the World Series in exactly 7 games if the winning team wins the last 3 games?

Of the 2,598,960 different five-card hands possible from a deck of 52 playing cards, how many would contain the following cards?

- 13) No face cards
- 14) Two black cards and three red cards
- 15) All red cards

Find the number of ways to get the following card combination from a 52-card deck.

- 16) Two black queens and two red jacks
- 17) No face cards in a five-card hand
- 18) All spades in a five-card hand
- 19) One spade, two hearts, and two diamonds

20) Two black cards and three red cards

21) If three cards are successively dealt from a 52-card deck without replacement, in how many ways could they be a face card, then a spade, and then a heart?

Solve the problem.

22) If you toss five fair coins, in how many ways can you obtain at least one head?

23) If you toss six fair coins, in how many ways can you obtain at least two heads?

24) In how many ways can a group of 6 students be selected from 7 students?

25) A class has 10 boys and 12 girls. In how many ways can a committee of four be selected if the committee can have at most two girls?

26) How many two-digit counting numbers do not contain any of the digits 1, 3, or 9?

27) If a license plate consists of four digits, how many different licenses could be created having at least one digit repeated.

Find the probability of the following card hands from a 52-card deck. In poker, aces are either high or low. A bridge hand is made up of 13 cards.

28) In poker, a flush (5 in same suit) in any suit

29) In poker, a straight flush (5 in a row in a single suit, but not a royal flush)

30) In bridge, 6 of one suit, 4 of another, and 3 of another

31) In poker, a full house (3 cards of one value, 2 of another value)

A bag contains 6 cherry, 3 orange, and 2 lemon candies. You reach in and take 3 pieces of candy at random. Find the probability.

32) All orange

33) 2 orange, 1 lemon

34) All lemon

35) One of each flavor

Solve the problem.

36) A ring contains 8 keys: 1 red, 1 blue, and 6 gold. If the keys are arranged at random on the ring, find the probability that the red is next to the blue.

37) What is the probability that at least 2 students in a class of 36 have the same birthday?

38) A roulette wheel contains 84 slots numbered 1 through 84. The slots 1,4,7,... are red, the slots 2,5,8,... are green, and the slots 3,6,19,... are brown. When the wheel is spun, a ball rolls around the rim and falls into a slot. What is the probability that the ball falls into a green slot?

Solve.

39) Two 6-sided dice are rolled. What is the probability the sum of the two numbers on the die will be 3?

Find the requested probability.

40) A fair coin is tossed 5 times. What is the probability of exactly 3 heads?

41) A fair coin is tossed 5 times. What is the probability of no heads?

A die is rolled five times and the number of fours that come up is tallied. Find the probability of getting the given result.

42) Exactly four fours

A die is rolled 20 times and the number of twos that come up is tallied. Find the probability of getting the given result.

43) More than one two

44) Exactly five twos

Find the requested probability.

45) A child rolls a 6-sided die 6 times. What is the probability of the child rolling exactly four fives?

- 46) What is the probability that 17 rolls of a fair die will show 5 fives?

In a certain college, 33% of the physics majors belong to ethnic minorities. Find the probability of the event from a random sample of 10 students who are physics majors.

- 47) Exactly 2 belong to an ethnic minority.
 48) No more than 6 belong to an ethnic minority.
 49) Exactly 4 do not belong to an ethnic minority.

Find the probability of the event.

- 50) A die is rolled 18 times and two threes come up.
 51) The probability that a radish seed will germinate is .7. The gardener plants 20 seeds and she harvests 16 radishes.

Prepare a probability distribution for the experiment. Let x represent the random variable, and let P represent the probability.

- 52) Three balls are drawn from a bag containing 5 red and 3 green balls. The number of green balls is counted.

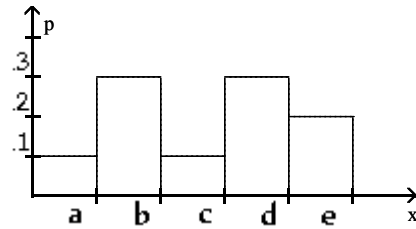
Give the probability distribution and sketch the histogram.

- 53) At a supermarket during the 6 p.m. rush, the manager counted the number of customers waiting in each of the 12 checkout lines. The results are shown in the table.

Number Waiting	Frequency
2	2
3	1
4	4
5	3
6	0
7	2
Total: 12	

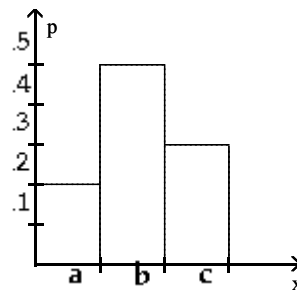
Find the expected value for the random variable x having this probability function.

54)



$$\begin{array}{lll} a = 12 & b = 14 & c = 16 \\ d = 18 & e = 20 & \end{array}$$

55)



$$\begin{array}{ll} a = 75 & b = 80 \\ c = 85 & \end{array}$$

Find the expected value for the random variable.

- 56) For a certain animal species, the probability that a female will have a certain number of offspring in a given year is given in the table below. Find the expected number of offspring per year.

Number of Offspring	0	1	2	3	4
Probability	.31	.21	.19	.17	.12

- 57) A business bureau gets complaints as shown in the following table. Find the expected number of complaints per day.

Complaints per Day	0	1	2	3	4	5
Probability	.04	.11	.26	.33	.19	.12

Solve the problem.

- 58) From a group of 3 men and 4 women, a delegation of 2 is selected. What is the expected number of men in the delegation?

- 59) If 3 balls are drawn from a bag containing 3 red and 4 blue balls, what is the expected number of red balls in the sample?
- 60) In a certain animal species, the probability that a female will have 0, 1, 2, 3, or 4 offspring in a given year is .31, .21, .19, .17, and .12 respectively. Find the expected number of offspring.
- 61) Find the expected number of girls in a family of 6.
- 62) Suppose a charitable organization decides to raise money by raffling a trip worth \$500. If 3000 tickets are sold at \$1.00 each, find the expected value of winning for a person who buys 1 ticket.
- 63) Suppose you pay \$1.00 to roll a fair die with the understanding that you will get back \$3.00 for rolling 1 or 3. What are your expected winnings?
- 64) Suppose you pay \$2.00 to roll a fair die with the understanding that you will get back \$6 for rolling a 5 or a 1, nothing otherwise. What are your expected winnings?
- 65) Numbers is a game where you bet \$1.00 on any three-digit number from 000 to 999. If your number comes up, you get \$600.00. Find the expected winnings.

Answer Key

Testname: 1324-CHP8-PT

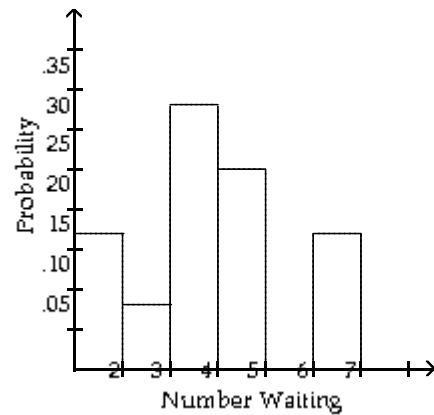
- 1) 1260
- 2) 120
- 3) 144
- 4) 144 ways
- 5) 15,120 ways
- 6) 72
- 7) 15 types
- 8) 210 three-digit numbers
- 9) 70
- 10) 60
- 11) 10 ways
- 12) 4 ways
- 13) 658,008 hands
- 14) 845,000 hands
- 15) 65,780 hands
- 16) 48 ways
- 17) 658,008 ways
- 18) 1287 ways
- 19) 79,092 ways
- 20) 845,000 ways
- 21) 1950 ways
- 22) 31 ways
- 23) 57 ways
- 24) 7 ways
- 25) 4620 ways
- 26) 42 numbers
- 27) 4960 licenses
- 28) .00198
- 29) 1.39×10^{-5}
- 30) .0133
- 31) 1.44×10^{-3}
- 32) .0061
- 33) .0364
- 34) 0
- 35) .2182
- 36) .286
- 37) .832
- 38) $\frac{1}{3}$
- 39) $\frac{1}{18}$
- 40) .3125
- 41) .0313
- 42) .003
- 43) .870
- 44) .129
- 45) .0080
- 46) .0893
- 47) .1990
- 48) .9815

- 49) .0547
- 50) .230
- 51) .130
- 52)

x	P
0	.179
1	.536
2	.268
3	.018

- 53)

Number:	2	3	4	5	6	7
Probability:	.17	.08	.33	.25	0	.17



- 54) 16.4
- 55) 80.5
- 56) 1.58
- 57) 2.98
- 58) .86
- 59) 1.29
- 60) 1.58
- 61) 3
- 62) $-\$.83$
- 63) \$0
- 64) \$0
- 65) $-\$.40$