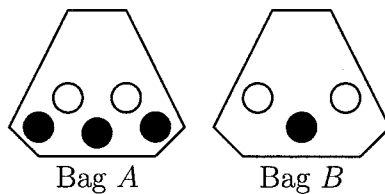


Mathcounts / AMC 8 (Week 10)

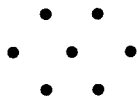
Name _____

- (1) _____ A point having whole-number coordinates is selected at random from the line $20x + y = 100$. What is the probability that the sum of the coordinates is less than 30? Express your answer as a common fraction.
- (2) _____ A fast food restaurant specializes in ham sandwiches. A customer may choose to add any of the following: mayonnaise, mustard, lettuce, tomato or cheese. How many different ham sandwich combinations are possible?
- (3) _____ Track practice lasts for one hour from 2:30-3:30. At a randomly selected time during track practice, Tania looks at her watch. What is the probability that the minute and hour hand on her watch form an acute angle? Express your answer as a common fraction.
- (4) _____ What fraction of the eleven letters in the word "MISSISSIPPI" are I's? Express your answer as a common fraction.
- (5) _____ Two numbers are chosen at random, with replacement, from the set $\{1, 2, 3, 4\}$. The two numbers are used as the numerator and denominator of a fraction. What is the probability that the fraction represents a whole number? Express your answer as a common fraction.
- (6) _____ Compute: $\frac{4!+3!}{3!+2!}$. Express your answer as a decimal to the nearest hundredth.
- (7) _____ There are several sets of three different numbers whose sum is 14 that can be chosen from the set $\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$. What fraction of these sets contains a 4? Express your answer as a common fraction.

- (8) _____ Angel wants to sell 50 identical pencils in groups of 2 or 3. In how many ways can the pencils be grouped?
- (9) _____ A four-digit number is created by using each of the digits 4, 5, 8 and 9 exactly once. What is the probability that the number will be a multiple of 4? Express your answer as a common fraction.
- (10) _____ There are six teams in a school district competition. Each team plays each other team once. What is the total number of games played in the competition?
- (11) _____ Each digit in the number 2001 is placed on a different card. In how many ways can three different cards be selected so that the product of the numbers on those cards is not zero?
- (12) _____ Camy made a list of every possible distinct five-digit positive even integer that can be formed using each of the digits 1, 3, 4, 5 and 9 exactly once in each integer. What is the sum of the integers on Camy's list?
- (13) _____ What is the positive difference between the probability of a fair coin landing heads up exactly 2 times out of 3 flips and the probability of a fair coin landing heads up 3 times out of 3 flips? Express your answer as a common fraction.
- (14) _____ Two bags of marbles are pictured below. One marble is randomly selected from Bag A and placed into Bag B. One marble is then randomly selected from Bag B. What is the probability that the marble selected from Bag B is black? Express your answer as a common fraction.



- (15) _____ The number 121 is a palindrome, because it reads the same backwards as forward. How many integer palindromes are between 100 and 500?
- (16) _____ If two distinct numbers are selected at random from the first seven prime numbers, what is the probability that their sum is an even number? Express your answer as a common fraction.
- (17) _____ Each day, two out of the three teams in a class are randomly selected to participate in a MATHCOUNTS trial competition. What is the probability that Team A is selected on at least two of the next three days? Express your answer as a common fraction.
- (18) _____ A bag contains 7 white, 9 blue and 4 red marbles. If three marbles are pulled from the bag, what is the probability that two are blue and one is red? Express your answer as a common fraction.
- (19) _____ A digital, 12-hour clock shows hours and minutes. During what fraction of the day will the clock show the digit 1 in its display? Express your answer as a common fraction.
- (20) _____ The first 20 numbers of an arrangement are shown below. What would be the value of the 40th number if the arrangement were continued?
- Row 1: 2, 2
 - Row 2: 4, 4, 4, 4
 - Row 3: 6, 6, 6, 6, 6, 6
 - Row 4: 8, 8, 8, 8, 8, 8, 8, 8
- (21) _____ What is the number of distinct ways of arranging the letters in the word AVERAGE?
- (22) _____ What is the probability of getting an even number when a fair six-sided die is rolled? Express your answer as a common fraction.

- (23) _____ P and Q are whole numbers such that $0 < P < 10$ and $0 < Q < 10$. How many common fractions $\frac{P}{Q}$ exist if $\frac{1}{2} < \frac{P}{Q} < 1$?
- (24) _____ How many different four-digit numbers can be obtained by using any four of the digits 2, 3, 4, 4, and 4?
- (25) _____ If digits may not be repeated, how many positive three-digit integers can be written using the digits 1, 2, 3 and 4?
- (26) _____ Ms. Albertson is randomly selecting the order in which her 25 students will each present a report next week. Five students will present each day, Monday through Friday. What is the probability that the shortest student will present his report on Thursday? Express your answer as a common fraction.
- (27) _____ What is the units digit of $1! + 3! + 5! + 7! + 9! + 11!$?
- (28) _____ Each point in the hexagonal lattice is one unit from its nearest neighbor.
How many circles of radius one contain at least two points of the lattice?
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- (29) _____ How many diagonals does a regular seven-sided polygon contain?
- (30) _____ The probability that Kim has a math test today is $\frac{4}{7}$. What is the probability that Kim does not have a math test today? Express your answer as a common fraction.