

PROBLEM SET 12-1
(Probability)

For each of the following, write the sample space using set notation:

1. Toss 2 coins
2. Toss 4 coins

You select a card from a standard deck of 52 playing cards. In how many ways can the following card be selected?

3. A red card
4. A heart
5. A queen and a heart
6. A queen or a heart
7. A queen that is not a heart

Two dice are rolled. State whether the events (A and B) are mutually exclusive and explain your reasoning.

8. A = the sum is a prime number
B = the sum is less than 4
9. A = the numbers are equal
B = the sum is odd
10. A = the product is greater than 20
B = the product is a multiple of 3

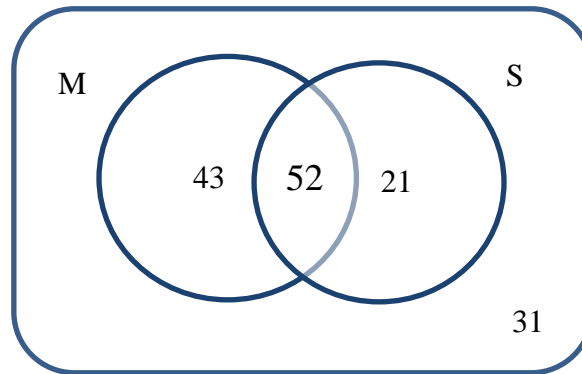
State whether each event (A and B) are independent and explain your reasoning.

- 11.** A = a month is selected at random
B = a number from 1-30 is selected at random
- 12.** A = a month is selected at random
B = a day of that month is selected at random
- 13.** A = a letter of the alphabet is selected at random
B = one of the remaining letters is selected at random
- 14.** A = the color of a car is selected at random
B = the type of transmission is selected at random

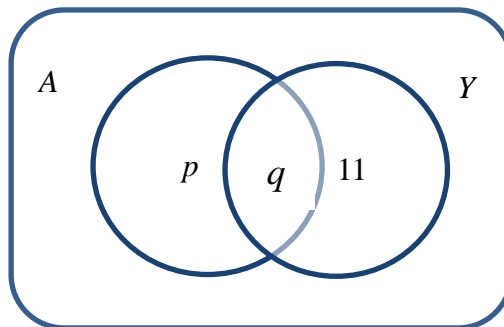
Find the theoretical probability of the following.

- 15.** A jar contains 30 red marbles, 50 blue marbles and 2 white marbles. You pick one marble from the jar at random.
- a.** $P(\text{red})$ **b.** $P(\text{blue})$
c. $P(\text{not white})$ **d.** $P(\text{red or blue})$
- 16.** Five cards are numbered 1-5. You choose one at random.
- a.** $P(\text{card is 2})$ **b.** $P(\text{even number})$
c. $P(\text{prime number})$ **d.** $P(\text{less than 5})$
- 17.** The letters in the word AARDVARK are printed on square pieces of cardboard with one letter per card. The eight letters are placed in a hat and one letter is chosen at random.
- a.** $P(\text{the letter chosen is a vowel})$
b. $P(\text{the letter chosen falls in the first half of the alphabet})$
c. $P(\text{the letter is a vowel or falls in the first half of the alphabet})$
- 18.** You are dealt 5 cards from a standard 52-card deck. Find the probability of being dealt all four of the 7's.³¹
- 19.** The Hoosier Lottery uses 48 numbers. Twice a week, 6 numbers are selected at random and to win, you must match all 6 numbers in any order. Find the probability of this happening.

20. In a class of 147 students, 95 are taking math (M), 73 are taking science (S) and 52 are taking both math and science. One student is picked at random. Find each probability



- $P(\text{taking math or science or both})$
 - $P(\text{not taking math})$
 - $P(\text{taking math but not science})$
 - $P(\text{taking neither math nor science})$
21. A fitness club has 60 members. 35 of the members attend the club's aerobics course (A) and 28 members attend the club's yoga course (Y). 17 members attend both courses. A Venn diagram is used to illustrate this situation.



- Find the values of q and r .
- Calculate the number of members of the fitness team who attend neither the aerobics course (A) nor the yoga course (Y).