1. In a drawer are 24 socks; 10 red, 8 white, and 6 blue. If 3 socks are drawn at random, what is the probability of getting one of each color?

(A) $\frac{5}{144}$  
(B) $\frac{10}{253}$  
(C) $\frac{30}{253}$  
(D) $\frac{60}{253}$  
(E) NOTA

2. In a family of 5 children, what is the probability exactly 3 are girls?

(A) $\frac{5}{16}$  
(B) $\frac{1}{32}$  
(C) $\frac{3}{5}$  
(D) $\frac{9}{32}$  
(E) NOTA

3. In a drawer are 27 socks; 8 blue, 6 black, 4 green, and 9 white. What is the smallest number you must randomly draw to have a probability of 1 that you have a pair of white socks?

(A) 8  
(B) 12  
(C) 16  
(D) 20  
(E) NOTA

4. In order, Anna, Beth, and Carrie take turns flipping the same fair coin. The first one to toss a head wins. What is the probability that Beth wins?

(A) $\frac{1}{4}$  
(B) $\frac{2}{7}$  
(C) $\frac{1}{3}$  
(D) $\frac{1}{2}$  
(E) NOTA

5. The digits 2, 4, 6, and 7 are each used once to form a 4-digit number. What is the probability that the number is divisible by 4?

(A) $\frac{1}{4}$  
(B) $\frac{7}{24}$  
(C) $\frac{1}{3}$  
(D) $\frac{4}{9}$  
(E) NOTA
6. The sum of the digits in a positive integer less than one thousand is 4. What is the probability the integer is prime?

(A) \( \frac{2}{7} \)  \quad (B) \( \frac{4}{15} \)  \quad (C) \( \frac{1}{3} \)  \quad (D) \( \frac{5}{14} \)  \quad (E) NOTA

7. There are an equal number of pennies, nickels, and dimes in a bag. What is the probability that the combined value of 3 coins randomly selected with replacement will be exactly 16 cents?

(A) \( \frac{1}{27} \)  \quad (B) \( \frac{2}{27} \)  \quad (C) \( \frac{2}{9} \)  \quad (D) \( \frac{8}{15} \)  \quad (E) NOTA

8. Three coins are dropped to the floor. If at least 2 of them are heads, what is the probability all three are heads?

(A) \( \frac{1}{8} \)  \quad (B) \( \frac{3}{4} \)  \quad (C) \( \frac{1}{4} \)  \quad (D) \( \frac{1}{2} \)  \quad (E) NOTA

9. Two 6-sided dice are rolled. What is the probability the total is prime?

(A) \( \frac{5}{12} \)  \quad (B) \( \frac{13}{36} \)  \quad (C) \( \frac{1}{3} \)  \quad (D) \( \frac{5}{11} \)  \quad (E) NOTA

10. Three 6-sided dice are rolled. What is the probability that the total is 10?

(A) \( \frac{1}{8} \)  \quad (B) \( \frac{1}{9} \)  \quad (C) \( \frac{1}{16} \)  \quad (D) \( \frac{1}{6} \)  \quad (E) NOTA

11. In a hopper are 26 ping-pong balls, each labeled with a different letter of the alphabet. If balls are selected randomly without replacement, what is the probability you will get 2 vowels (A,E,I,O,U) before you get 2 consonants?

(A) \( \frac{7}{260} \)  \quad (B) \( \frac{2}{65} \)  \quad (C) \( \frac{21}{260} \)  \quad (D) \( \frac{11}{130} \)  \quad (E) NOTA
12. If a six-sided die is rolled six times, what is the probability of two or more 5's?

(A) \( \frac{625}{46656} \) (B) \( \frac{3125}{15552} \) (C) \( \frac{12281}{46656} \) (D) \( \frac{1}{3} \) (E) NOTA

13. Find the probability that a random point on the interior of a circle of radius 3 is more than 2 units from the center.

(A) \( \frac{1}{3} \) (B) \( \frac{4}{9} \) (C) \( \frac{1}{2} \) (D) \( \frac{5}{9} \) (E) NOTA

14. Kelly tosses 19 fair coins and Jessica tosses 20 fair coins. What is the probability that Jessica gets more heads than Kelly?

(A) \( \frac{19}{39} \) (B) \( \frac{1}{2} \) (C) \( \frac{20}{39} \) (D) \( \frac{5}{8} \) (E) NOTA

15. At the start a jar contains only quarters and coins of lesser value. The average value of these coins is 9 cents. Adding a quarter to the jar raises the average value to 11 cents. Find the probability that a coin randomly selected from the jar at the start is a quarter.

(A) \( \frac{2}{9} \) (B) \( \frac{1}{4} \) (C) \( \frac{2}{7} \) (D) \( \frac{1}{3} \) (E) NOTA

16. A cube measuring 3 inches on a side is painted and then cut into 27 cubes measuring 1 inch on a side. One of the cubes is randomly selected and tossed. What is the probability all 5 of the faces showing are unpainted?

(A) \( \frac{1}{27} \) (B) \( \frac{2}{27} \) (C) \( \frac{1}{9} \) (D) \( \frac{7}{27} \) (E) NOTA
For problems 17-19 use the information that follows. You have 2 hoppers. One has 15 ping pong balls numbered 1-15. The other has 25 ping pong balls numbered 1-25. If one ball is randomly selected from each hopper find the probability of each event.

17. Both are even numbers.
   (A) \( \frac{104}{375} \)  (B) \( \frac{28}{125} \)  (C) \( \frac{19}{80} \)  (D) \( \frac{1}{4} \)  (E) NOTA

18. At least one is a multiple of 3.
   (A) \( \frac{49}{75} \)  (B) \( \frac{41}{75} \)  (C) \( \frac{4}{9} \)  (D) \( \frac{13}{40} \)  (E) NOTA

19. The sum of the two numbers is greater than 20.
   (A) \( \frac{13}{25} \)  (B) \( \frac{20}{39} \)  (C) \( \frac{1}{2} \)  (D) \( \frac{188}{375} \)  (E) NOTA

20. How many people would have to be randomly selected for the probability to be greater than 50% that at least one had a birthday on February 29?
   (A) 1013  (B) 731  (C) 366  (D) 730  (E) NOTA

21. Five cards are randomly selected from a standard 52-card deck. What is the probability all are the same suit?
   (A) \( \frac{66}{54145} \)  (B) \( \frac{33}{54145} \)  (C) \( \frac{33}{66640} \)  (D) \( \frac{33}{16660} \)  (E) NOTA
22. You flip a coin until you have 4 heads or 4 tails. What is the probability the game is over after exactly 5 flips?

(A) \( \frac{3}{8} \)  
(B) \( \frac{1}{4} \)  
(C) \( \frac{1}{8} \)  
(D) \( \frac{5}{16} \)  
(E) NOTA

23. You have 27 coins that have a total value of 79 cents. All the coins are pennies or nickels. What is the probability that a coin selected at random is a penny?

(A) \( \frac{4}{27} \)  
(B) \( \frac{1}{3} \)  
(C) \( \frac{14}{27} \)  
(D) \( \frac{19}{27} \)  
(E) NOTA

24. If \( a \) is randomly chosen from \( K=\{-2,-1,0,1,2\} \), \( b \) is randomly chosen from \( L=\{-2,-1,0,1,2\} \), and \( c \) is randomly chosen from \( M=\{-4,-2,0,2,4\} \), what is the probability that \((x,y)=(2,-1)\) is a solution to \( ax+by=c \)?

(A) \( \frac{11}{125} \)  
(B) \( \frac{12}{125} \)  
(C) \( \frac{13}{125} \)  
(D) \( \frac{3}{25} \)  
(E) NOTA

25. Two numbers are selected from the set \( \{1,2,3,4,5,6,7,8,9\} \) without replacement. What is the probability that the product of the numbers selected is a multiple of 4?

(A) \( \frac{1}{4} \)  
(B) \( \frac{5}{12} \)  
(C) \( \frac{4}{9} \)  
(D) \( \frac{17}{36} \)  
(E) NOTA

26. Given a 3-digit whole number, what is the probability the hundreds digit is even, the tens digit is odd, and all 3 digits are different?

(A) \( \frac{14}{81} \)  
(B) \( \frac{4}{25} \)  
(C) \( \frac{1}{5} \)  
(D) \( \frac{8}{45} \)  
(E) NOTA
THETA DIVISION—PROBABILITY TOPIC TEST
ANSWER KEY

1. D
2. A
3. D
4. B
5. C
6. B
7. C
8. C
9. A
10. A
11. D
12. C
13. D
14. B
15. C
16. B
17. B
18. B
19. A
20. A
21. D
22. B
23. C
24. C
25. C
26. D