

Chapter 7
Answer Section

NUMERIC RESPONSE

1. ANS: 56
 DIF: Average TOP: 7-1 Permutations and Combinations MSC: DOK 3
2. ANS: $\frac{3}{8}$
 DIF: Advanced TOP: 7-2 Theoretical and Experimental Probability
 MSC: DOK 4
3. ANS: 0.7
 DIF: Advanced TOP: 7-5 Compound Events MSC: DOK 4

MATCHING

4. ANS: F DIF: Basic TOP: 7-2 Theoretical and Experimental Probability
 MSC: DOK 1
5. ANS: G DIF: Basic TOP: 7-1 Permutations and Combinations
 MSC: DOK 1
6. ANS: H DIF: Basic TOP: 7-2 Theoretical and Experimental Probability
 MSC: DOK 1
7. ANS: D DIF: Basic TOP: 7-1 Permutations and Combinations
 MSC: DOK 1
8. ANS: C DIF: Basic TOP: 7-1 Permutations and Combinations
 MSC: DOK 1
9. ANS: A DIF: Basic TOP: 7-1 Permutations and Combinations
 MSC: DOK 1
10. ANS: A DIF: Basic TOP: 7-2 Theoretical and Experimental Probability
 MSC: DOK 1
11. ANS: G DIF: Basic TOP: 7-2 Theoretical and Experimental Probability
 MSC: DOK 1
12. ANS: B DIF: Basic TOP: 7-2 Theoretical and Experimental Probability
 MSC: DOK 1
13. ANS: D DIF: Basic TOP: 7-2 Theoretical and Experimental Probability
 MSC: DOK 1
14. ANS: C DIF: Basic TOP: 7-2 Theoretical and Experimental Probability
 MSC: DOK 1

15. ANS: B DIF: Basic TOP: 7-2 Theoretical and Experimental Probability
 MSC: DOK 1
16. ANS: D DIF: Basic TOP: 7-2 Theoretical and Experimental Probability
 MSC: DOK 1
17. ANS: A DIF: Basic TOP: 7-2 Theoretical and Experimental Probability
 MSC: DOK 1
18. ANS: C DIF: Basic TOP: 7-2 Theoretical and Experimental Probability
 MSC: DOK 1
19. ANS: G DIF: Basic TOP: 7-2 Theoretical and Experimental Probability
 MSC: DOK 1
20. ANS: C DIF: Basic TOP: 7-5 Compound Events
 MSC: DOK 1
21. ANS: G DIF: Basic TOP: 7-3 Independent and Dependent Events
 MSC: DOK 1
22. ANS: B DIF: Basic TOP: 7-3 Independent and Dependent Events
 MSC: DOK 1
23. ANS: E DIF: Basic TOP: 7-5 Compound Events
 MSC: DOK 1
24. ANS: D DIF: Basic TOP: 7-3 Independent and Dependent Events
 MSC: DOK 1

SHORT ANSWER

25. ANS:

24 outfits

Number of tops	times	Number of bottoms	times	Number of scarves
4	×	2	×	3

The total number of outfits is $4 \times 2 \times 3 = 24$.

DIF: Basic

STA: CACACS.MTH.97.AL2.A11.8.0

TOP: 7-1 Permutations and Combinations

MSC: DOK 2

26. ANS:

24 ways

Since the order matters, use the formula for permutations.

$$4! = \frac{4!}{(4-4)!} = \frac{4!}{0!}$$

Since $0! = 1$, the number of ways is $4! = 24$.

DIF: Average

TOP: 7-1 Permutations and Combinations

KEY: permutation ♥ ordering

MSC: DOK 3

27. ANS:

720 ways

Step 1 Determine whether the problem represents a combination or a permutation.

The order does not matter because choosing a green shirt, a blue shirt, and a red shirt is the same as choosing a red shirt, a blue shirt, and a green shirt. It is a combination.

Step 2 Use the formula for combinations.The number of combinations of n items taken r at a time is ${}_n C_r = \frac{n!}{r!(n-r)!}$.

$${}_{12} C_5 = \frac{12!}{5!(12-5)!} \quad n = 12 \text{ and } r = 5$$

$${}_{12} C_5 = \frac{12 \cdot 11 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 \cdot (7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1)}$$

Expand.

$${}_{12} C_5 = \frac{12 \cdot 11 \cdot 10 \cdot 9 \cdot 8 \cdot \cancel{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 \cdot (\cancel{7+6+5+4+3+2+1})} = \frac{12 \cdot 11 \cdot 10 \cdot 9 \cdot 8}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}$$

Divide out common factors.

$${}_{12} C_5 = \frac{12 \cdot 11 \cdot 10 \cdot 9 \cdot 8}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = \frac{12 \cdot 11 \cdot \cancel{10} \cdot 9}{\cancel{5} \cdot \cancel{4} \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{1}} = 12 \cdot 11 \cdot 2 \cdot 3 = 720$$

Simplify.

There are 720 ways to select a group of 5 shirts from 12.

DIF: Average TOP: 7-1 Permutations and Combinations MSC: DOK 3

28. ANS:

$$\frac{1}{3}$$

There are six possible outcomes when a fair number cube is rolled. Because the number cube is fair, all outcomes are equally likely.

There are two numbers greater than 4 on the number cube: 5 and 6. So the probability of rolling one of these numbers is

$$\frac{2}{6} = \frac{1}{3}$$

DIF: Basic TOP: 7-2 Theoretical and Experimental Probability

KEY: probability ♥ theoretical probability MSC: DOK 2

29. ANS:

85.7%

 $P(\text{different days}) = 1 - P(\text{Monday})$

Use the complement.

$$= 1 - \left(\frac{1}{7}\right)$$

There are 7 days in the week.

$$= 85.7\%$$

DIF: Basic TOP: 7-2 Theoretical and Experimental Probability

MSC: DOK 2

30. ANS:

21.5%

Find the ratio of the area of the region inside the square but outside the circle to the total area of the square.

The area of the region outside the circle is equal to the area of the square minus the area of the circle.

$$A_o = A_s - A_c$$

$$A_o = (4^2) - (\pi(2)^2) = 16 - 4\pi$$

$$\frac{\text{Area outside region}}{\text{Area square}} = \frac{A_o}{A_s} = \frac{16 - 4\pi}{16} = 0.215 = 21.5\%$$

DIF: Average

TOP: 7-2 Theoretical and Experimental Probability

MSC: DOK 3

31. ANS:

0.121

Use the Female row. Of 66,033,000 female labor force, 8,004,000 work in the Industry field.

$$P(\text{Industry}|\text{Female}) = \frac{8,004,000}{66,033,000} \approx 0.121$$

33. ANS:

	Black	Silver	White	Other	Total
Men	0.0875	0.1125	0.1	0.2	0.5
Women	0.1125	0.1375	0.125	0.125	0.5
Total	0.2	0.25	0.225	0.325	1

DIF: Average

TOP: 7-4 Two-Way Tables

KEY: two-way tables

MSC: DOK 3

34. ANS:

0.23

DIF: Average

TOP: 7-4 Two-Way Tables

KEY: two-way tables

MSC: DOK 3

35. ANS:

Express Way Lines has the best on-time performance; Divide the joint relative frequency of on-time arrival by the marginal relative frequency to find the best performance.

DIF: Advanced

TOP: 7-4 Two-Way Tables

KEY: two-way tables

MSC: DOK 4

36. ANS:

0.4271

Use the complement. $P(\text{at least 2 the same}) = 1 - P(\text{all different})$

$$P(\text{all different}) = \frac{12P_4}{12^4} = \frac{12 \cdot 11 \cdot 10 \cdot 9}{12 \cdot 12 \cdot 12 \cdot 12} = 0.5729$$

$$P(\text{at least 2 the same}) = 1 - 0.5729 = 0.4271$$

The probability that at least 2 students chose the same flavor is about 0.4271 or 42.71%.

DIF: Average

TOP: 7-5 Compound Events

MSC: DOK 3