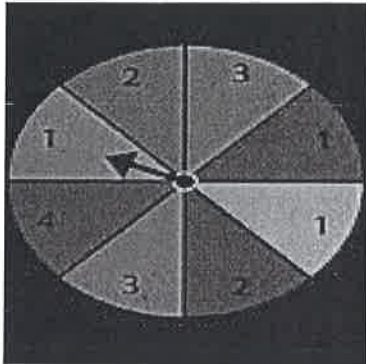


Probability Test Review 2019

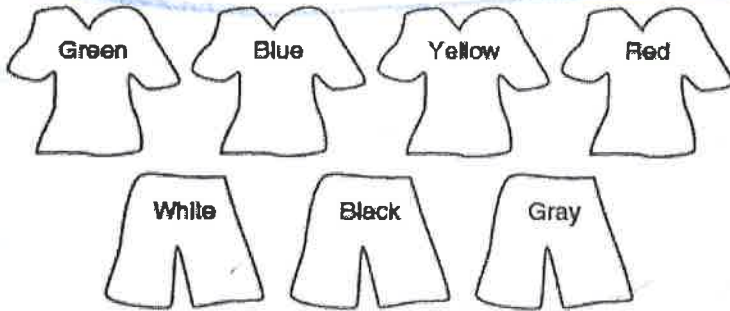
Pre-Test

1. What is the sample space of the spinner?



1, 1, 1, 2, 2, 3, 3, 4

2. You have 4 tee-shirts and 3 pair of shorts in a drawer, as shown in the diagram. You randomly choose one shirt and one pair of shorts from the drawer.



If you treat it as Same Set:  
 $(\frac{1}{7} + \frac{1}{7}) - (\frac{1}{7})(\frac{1}{7}) = \frac{13}{49}$

If you treat as different sets:  
 $(\frac{1}{4} + \frac{1}{3}) - (\frac{1}{4})(\frac{1}{3}) = \frac{1}{2}$

- a. Use the Counting Principle to calculate the size of the sample space. Show your calculations.

$4 \times 3 = 12$

- b. What is the probability of choosing a blue shirt or a gray pair of shorts?

two acceptable answers

3. You write each of the 26 letters of the alphabet on separate index cards.

- a. If you choose 3 cards at random without replacing them, what is the probability of choosing A, B, and C?

$\frac{1}{26} \times \frac{1}{25} \times \frac{1}{24} = \frac{1}{15600}$

- b. If you choose 2 cards at random without replacing them, what is the probability that you will not draw an A?

$\frac{25}{26} \times \frac{24}{25} = \frac{600}{650} = \frac{12}{13}$

## Standardized Test Practice

4. The menu for a restaurant lists 3 types of soup, 5 types of sandwiches, and 4 types of salads. Which is the correct probability model for choosing an item at random from the menu?

a.

Outcomes	Soup	Sandwich	Salad
Probability	$\frac{1}{3}$ , or 0.333	$\frac{1}{5}$ , or 0.2	$\frac{1}{4}$ , or 0.25

b.

Outcomes	Soup	Sandwich	Salad
Probability	$\frac{1}{3}$ , or 0.333	$\frac{5}{7}$ , or 0.714	$\frac{1}{2}$ , or 0.5

c.

Outcomes	Soup	Sandwich	Salad
Probability	$\frac{1}{4}$ , or 0.25	$\frac{1}{5}$ , or 0.2	$\frac{1}{5}$ , or 0.2

d.

Outcomes	Soup $\frac{3}{12}$	Sandwich $\frac{5}{12}$	Salad $\frac{4}{12}$
Probability	$\frac{1}{4}$ , or 0.25	$\frac{5}{12}$ , or 0.417	$\frac{1}{3}$ , or 0.333

5. A local charity is selling raffle tickets to earn money. They print 300 tickets, each with a different number on it. You buy 4 of the tickets. What is the **theoretical** probability that you will win the lottery?

a.  $\frac{1}{24}$

b.  $\frac{1}{25}$

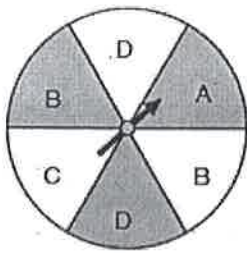
c.  $\frac{1}{74}$

d.  $\frac{1}{75}$

$$\frac{4}{300} \leftarrow \begin{array}{l} \text{desired} \\ \text{outcome} \end{array}$$

$$\leftarrow \text{total \# outcomes}$$

6. You spin the spinner two times. What is the probability that it will land on a B the first time or an A the second time?



$$\frac{2}{6} + \left(\frac{1}{6}\right) - \left(\frac{2}{6}\right)\left(\frac{1}{6}\right) = \frac{4}{9}$$

- a.  $\frac{1}{2}$
- b.  $\frac{1}{3}$
- c.  $\frac{4}{9}$
- d.  $\frac{1}{18}$

↳ different/separate sets

7. Which describes independent events from disjoint sets?

- a. A bag contains red, green, and blue marbles. You randomly draw 2 marbles at the same time and want to know the probability that either marble is red.
- b. Lunch includes your choice of salad and your choice of vegetables. You want to know the probability of choosing a house salad and broccoli as your vegetable.
- c. A math class has 25 students. The teacher randomly chooses 2 students. You want to know the probability that one of the two students will be female.
- d. There are 100 raffle tickets, and you buy 4 of them. You want to know the probability that you will win if 2 tickets are chosen at random from the 100.

8. Jill buys one lottery ticket for which she randomly chooses 3 numbers ranging from 1 to 24. The winning numbers of the lottery are randomly selected from 3 bins. Each bin contains balls with the numbers 1 through 24 written on them. What is the probability that Jill will win the lottery?

- a.  $\frac{1}{512}$
- b.  $\frac{1}{4608}$
- c.  $\frac{1}{12,144}$
- d.  $\frac{1}{13,824}$

$$\frac{1}{24} \times \frac{1}{24} \times \frac{1}{24}$$

bin 1      bin 2      bin 3

$$\frac{1}{13,824}$$

$$1^3 = 1$$

$$24^3 = 13824$$

9. Suppose you write the numbers 1 to 10 on separate index cards. You randomly choose one card, place it back in the set, and then randomly choose another card. What is the probability that the first card you choose has a 1 on it or the second card has a 2 on it?

- a.  $\frac{1}{5}$
- b.  $\frac{2}{5}$
- c.  $\frac{1}{100}$
- d.  $\frac{19}{100}$

~~$\frac{2}{10} + \frac{2}{10} = \frac{4}{10} = \frac{2}{5}$~~

1+10  
have  
a 1 on it

$\left(\frac{2}{10}\right) + \left(\frac{1}{10}\right) - \left(\frac{2}{10}\right)\left(\frac{1}{10}\right) = \frac{7}{25}$

Answer but not a choice. Possibly a typo!

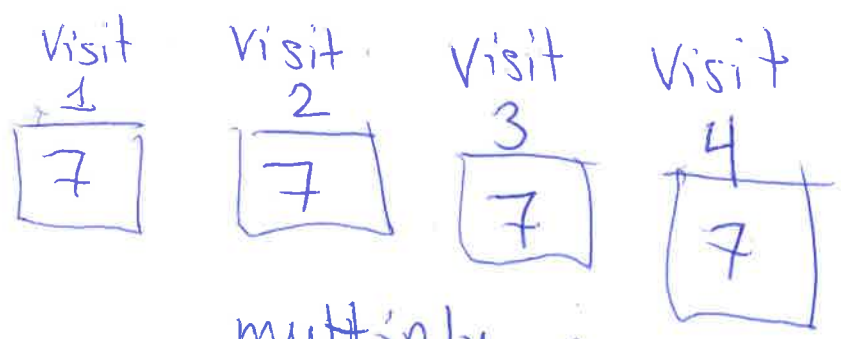
10. Which shows a uniform probability model?

a.	Outcomes	A	B	C
	Probability	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$
b.	Outcomes	A	B	C
	Probability	$\frac{2}{7}$	$\frac{1}{7}$	$\frac{4}{7}$
c.	Outcomes	A	B	C
	Probability	$\frac{1}{4}$	$\frac{3}{16}$	$\frac{1}{2}$
d.	Outcomes	A	B	C
	Probability	$\frac{1}{8}$	$\frac{1}{5}$	$\frac{1}{4}$

all equal chances  
non-uniform  
"  
"

11. The gym where Jonathan works out has 7 treadmills. Each time he visits the gym, he randomly chooses one of the treadmills to use. Which calculation shows the number of possible orders of treadmills Jonathan can choose during 4 visits?

- a.  $4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4$
- b.  $6 \cdot 5 \cdot 4$
- c.  $7 \cdot 4$
- d.  $7 \cdot 7 \cdot 7 \cdot 7$



multiply them together

12. A deli offers up to 16 different toppings on their sub sandwiches. How many different 3-topping sandwiches are possible?

- a. 48 sandwiches
- b. 495 sandwiches
- c. 560 sandwiches
- d. 4096 sandwiches

$${}_{16}C_3 = \boxed{560}$$

Combinations

$$\frac{16!}{3!(16-3)!} = \frac{16!}{3!13!} = \frac{16 \cdot 15 \cdot 14}{3 \cdot 2} = \frac{3360}{6} = 560$$

Use the Counting Principle to determine the number of possible outcomes for each situation. Show your calculations.

13. A restaurant offers a special price for customers who order a sandwich, soup, and a drink for lunch. The diagram shows the restaurant's menu. How many different lunches are possible?

Use the counting principle.

Lunch Menu		
Sandwiches	Soup	Drinks
Cheese	Minestrone	Cola
Chicken	Chicken Noodle	Tea
Ham and Egg	Vegetable	Coffee
Turkey Club	Italian Wedding	Strawberry
Veggie Lovers	Potato Cheddar	Mountain Dew
5	5	5

$$5 \times 5 \times 5 = \boxed{125}$$

Determine the probability that each event will occur. Then determine the probability that both or all of the dependent events will occur. Show your calculations.

14. A common deck of playing cards includes 4 aces. Altogether there are 52 cards. If you randomly choose 4 cards from the deck, what is the probability of choosing 4 aces?

End of Chapter Test

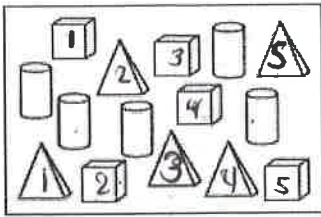
$$\frac{4}{52} \cdot \frac{3}{51} \cdot \frac{2}{50} \cdot \frac{1}{49} = \frac{24}{6,497,400}$$

15. State whether each question uses **permutations** or **combinations**. Then calculate the answer.

- a. How many different numbers can be made using any four digits of 148,923?  
*order → arrangements of*  
**Permutation:**  ${}_{6}P_4 = \frac{6!}{(6-4)!} = \frac{6!}{2!} = 6 \cdot 5 \cdot 4 \cdot 3 = \boxed{360}$
- b. How many different 3-person committees can be made up if the members are chosen from 8 employees?  
**Combination:**  ${}_{8}C_3 = \frac{8!}{3!(8-3)!} = \frac{8!}{3!5!} = \frac{8 \cdot 7 \cdot 6}{3 \cdot 2} = \frac{336}{6} = 56$
- c. A baseball team has 20 players, but only 9 can be on the field at any one time. How many different teams can be assembled if any 9 of the players can be on the field?

**Combination:**  ${}_{20}C_9 = \frac{20!}{9!(20-9)!} = \frac{20!}{9!11!} = \frac{20 \cdot 19 \cdot \dots \cdot 12}{9 \cdot \dots}$   
 $= 167,960$

16. Sandra randomly chooses two of the shapes from the set at the same time. What is the probability that one shape is a cube or a pyramid?



$$\frac{5}{15} + \frac{5}{15} = \frac{5}{15} \times \frac{5}{14} = \frac{23}{42}$$

17. Juli wants to see the monkeys (M), the lions (L), and the zebras (Z) during her afternoon visit to a zoo. She plans to randomly choose the order for her visit. List the sample space for all the different orders she could visit the animals.

MLZ, ZLM, LMZ  
MZL, ZML, LZM

18. Trevor, Allie, and Jack are in the same math class at school. The teacher randomly chooses 3 of the 26 members of the class to show their homework on the board. What is the probability that Trevor is chosen 1<sup>st</sup>, Allie 2<sup>nd</sup>, and Jack 3<sup>rd</sup>?

$$\frac{1}{26} \times \frac{1}{25} \times \frac{1}{24} = \frac{1}{15600}$$

19. A fair 6-sided cube has a different color on each side—red, blue, green, orange, purple, and yellow. Evan rolls the cube 3 times. What is the probability that he will roll purple all 3 times?

$$\frac{1}{6} \cdot \frac{1}{6} \cdot \frac{1}{6} = \frac{1}{216}$$

20. How many different arrangements are there for the letters from the word ELEPHANT?

$\frac{n!}{k!}$

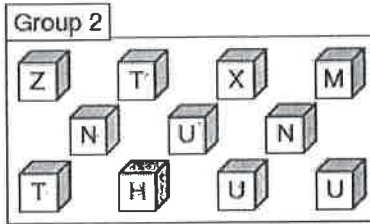
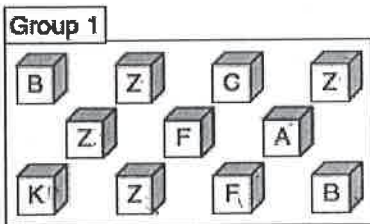
$$\frac{8!}{2!} = 20160$$

21. You are invited to prom with your best friend. There are 6 people at each round table. How many different ways can the people be arranged at the tables?

$(n-1)!$

$$(6-1) = 5! = 120$$

22. Ricardo randomly chooses a block from each of the two groups shown in the figure. What is the probability that he will choose a Z from the first group and a T from the second group?



$$\frac{4}{11}$$

$$\frac{2}{11}$$

$$\frac{4}{11} \times \frac{2}{11} = \frac{8}{121}$$