Review for Exam 4 (Sections 7.1-7.4, 8.1-8.3, 8.6) NAMES:

Answer all questions in the space provided. Circle your final answers if there is a lot of intermediate work. Proofread your written answers for content and legibility.

The formula for permutations and combinations are as follows.

$$ {}_nP_r = \frac{n!}{(n-r)!} \qquad {}_nC_r = \frac{{}_nP_r}{r!} = \frac{n!}{(n-r)!r!} $$

1. What is the main difference between permutations and combinations?

2. Julian is buying a new car. There are three different sport packages and five colors from which to choose. In addition, he can choose automatic or manual transmission. How many different ways can he choose his car?

3. Find the following. You may use the calculator.

a.) ${}_8P_3$

b.) ${}_{10}C_2$

4. Write down the sample space for rolling two distinguishable, six-sided dice.

5. Sam is taking a test with four multiple-choice questions followed by two true-false questions. If each multiple-choice question has four answers, how many different answer sheets are possible?

6. Consider rolling a fair six-sided die and tossing a coin. Write down the sample space for this experiment and then use it to answer the following question. What is the probability that you get an even number on the die and a tails on the coin? Explain.

7. How many different ways can the word TENNESSEE be rearranged?

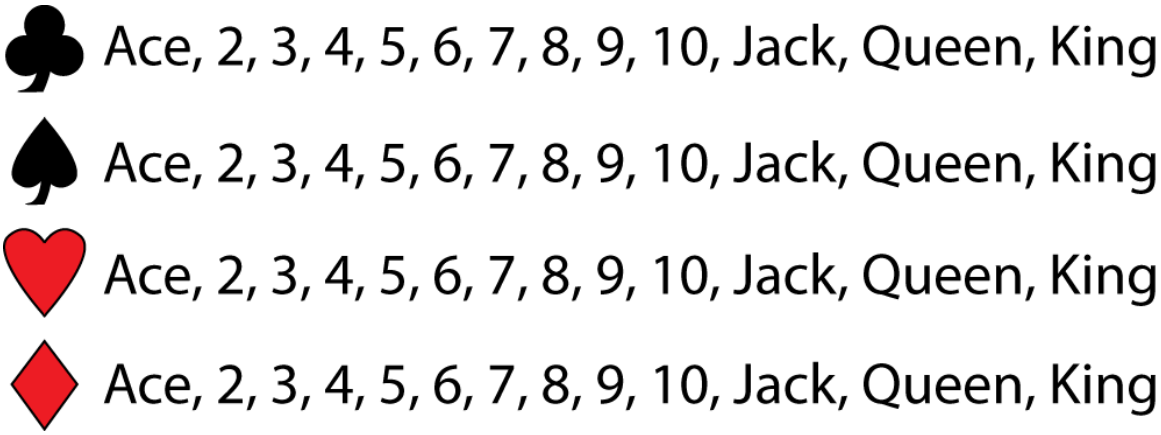
8. Ten people are competing in a trivia contest. How many ways can 1^{st} and 2^{nd} place prizes be given out?

9. There are fifteen kids in Penn's kindergarten class. If he can invite five of them to a birthday party, how many different guest lists are possible?

10. Consider the experiment of drawing a single card from a poker deck.

This experiment has the sample space shown below. (A poker deck has 52 cards. There are four suits: clubs, spades, hearts, and diamonds. There are 13 cards in each suit, as shown below. The hearts and diamonds are red cards and the clubs and spades are black.)

Find the probability of drawing a Jack **and** circle the successes in the list below.



11. If you pick two cards out of a poker deck in succession, what is the probability that they will both be Aces? Consider this question under the two different scenarios.

a.) You replace the first card in the deck before you pick the second card. What is the probability that they will both be Aces?

b.) You keep the first card in your hand, selecting the second card from the 51 cards remaining. What is the probability that they will both be Aces?

c.) Explain why the probability that both cards will be Aces differs depending on the small variation described in parts *a* and *b*.

12. For question 6 of this worksheet, you explored the experiment of tossing a coin and rolling a six-sided die. You were asked to find the probability of an even number on the die and a tails on the coin by examining the sample space. Explain how the idea of independence can help you find this probability another way.

13. Make up an experiment and define two events that are complementary.

14. In the seventeenth century, a wealthy Frenchman known as Chevalier de Mere was fond of betting that, if a die is rolled four times, the number 6 will turn up at least once.

a.) If a die is rolled once, what is the probability that it will *not* turn up a 6?

b.) What is the probability that, if a die is rolled four times, it will *not* turn up 6 on any of the rolls? Express it to the nearest percent.

c.) What is the probability to the nearest percent that, if a die is rolled four times, the number 6 will turn up at least once?

d.) Would it be better to bet in favor of *or* against this happening? Explain.