

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Advanced Functions - Review for Probability Test WS

Directions: Complete each problem. Show work in space provided!

- A yogurt shop offers 6 different flavors of frozen yogurt and 12 different toppings. How many choices are possible for a single serving of frozen yogurt with one topping?  $12 \times 6 = 72 \text{ choices}$
- Suppose Ruth Ann has 3 routes she can choose from to get from school to the library, and 5 routes from the library to her home. How many routes are there from Ruth Ann's school to her home with a stop at the library?  $3 \times 5 = 15 \text{ routes}$
- Caleb is creating a password for his email account. He wants to create a password with the following conditions:
  - The password has to be 5 characters.
  - The first character can only be digits 0-3.
  - The second character can only be a letter.
  - The third and fourth characters can only be digits 0-9.
  - The fifth character can only be a vowel.
  - Digits cannot be repeated but letters can be repeated.
$$\frac{4}{\text{digit } 0-3 \text{ no rep}} \times \frac{26}{\text{letter rep}} \times \frac{9}{\text{digit } 0-9 \text{ no rep}} \times \frac{8}{\text{digit } 0-9 \text{ no rep}} \times \frac{5}{\text{letter vowel rep}} = 37,440 \text{ passwords}$$
- Verne has 6 math books to arrange on a shelf. Jenny has 4 English books to arrange on a shelf. In how many more orders can Verne arrange his books than Jenny?  $V \rightarrow 6P_6 = 720$   
 $J \rightarrow 4P_4 = 24$   
 $720 - 24 = 696 \text{ more}$
- In how many ways can three singers be selected from five who came to an audition?  $5C_3 = 10 \text{ ways}$
- In how many distinct ways can the letters of the word HAWAIIAN be rearranged?  $3A's, 2I's, 8 \text{ letters total}$   
 $\frac{8!}{(3!2!)} = 3,360$
- A person is selected at random. What is the probability that the person was not born on a Thursday?  $\frac{6}{7} = 85.7\%$
- In a basket, there are 7 male kittens and 5 female kittens. Donna randomly selects one, puts it back, and then random selects another. What is the probability that both selections were female kittens?  $12 \text{ total}$   
 $\frac{5}{12} \cdot \frac{5}{12} = \frac{25}{144} = 17.4\%$
- A box contains 6 nuts, 8 bolts, and 4 screws. If three objects are selected in succession randomly, what is the probability of selecting a nut, then a bolt, and then a screw, if no replacement occurs each time?  $18 \text{ total}$   
 $\frac{6}{18} \cdot \frac{8}{17} \cdot \frac{4}{16} = \frac{192}{4896} = 3.9\%$
- There are 24 children in a class, 16 brown-haired and 8 black-haired. Two students are randomly selected for a stage performance. What is the probability of selection to be 2 brown-haired children?  $\frac{16C_2}{24C_2} = \frac{120}{276} = 43.5\%$
- A bag contains 9 red marbles, 5 white marbles, and 3 blue marbles. What is the probability of selecting a red marble or a blue marble?  $17 \text{ total}$   
 $\frac{9}{17} + \frac{3}{17} = \frac{12}{17} = 70.6\%$
- Two urns contain white balls and yellow balls. The first urn contains 9 white balls and 9 yellow balls and the second urn contains 8 white balls and 3 yellow balls. A ball is drawn at random from each urn. What is the probability that both balls are white?

Urn #1
9W
9Y
18 total

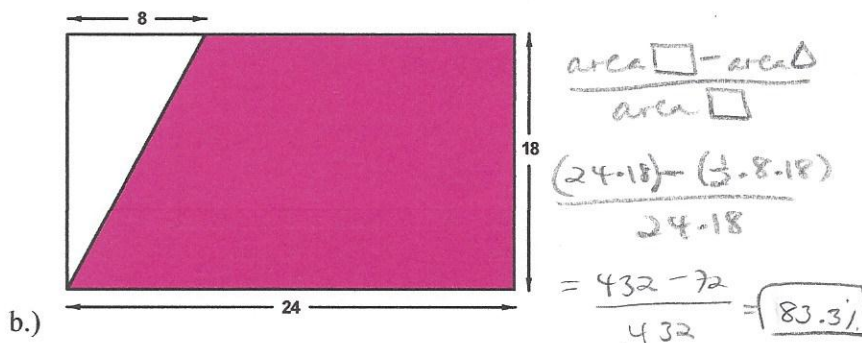
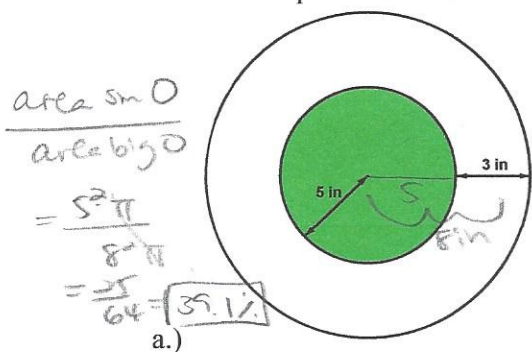
Urn #2
8W
3Y
11 Total

$$\frac{9}{18} \cdot \frac{8}{11} = \frac{72}{198} = 36.4\%$$

13. A movie company surveyed 1000 people. Two hundred twenty-nine people said they went to see the movie on Friday, two hundred fifty-six said they went on Saturday. If twenty-four people said they saw the movie on both nights, what is the probability that a person chosen at random saw the movie on Friday or Saturday?

$$\frac{229}{1000} + \frac{256}{1000} - \frac{24}{1000} = \frac{461}{1000} = 46.1\%$$

14. A dart is thrown at the following boards. Find the probability that it lands in the shaded region. Leave your answer as a percent rounded to nearest tenth.



15. A card is drawn at random from a deck of cards. Find each probability:

a.) P (face card or has a number on it that is a multiple of 5)  $\frac{12}{52} + \frac{8}{52} = \frac{20}{52} = 38.5\%$

b.) P (ace or club)  $\frac{4}{52} + \frac{13}{52} - \frac{1}{52} = \frac{16}{52} = 30.8\%$

c.) P (red or king)  $\frac{26}{52} + \frac{4}{52} - \frac{2}{52} = \frac{28}{52} = 53.8\%$

16. A coin is tossed 8 times. Find P (exactly 6 occurrences of tails).

$$8C_6 \left(\frac{1}{2}\right)^6 \left(\frac{1}{2}\right)^2 = 10.9\%$$

17. A coin is tossed 5 times. Find P (at least four heads).

$$P(4) + P(5) \rightarrow 5C_4 \left(\frac{1}{2}\right)^4 \left(\frac{1}{2}\right)^1 + 5C_5 \left(\frac{1}{2}\right)^5 \left(\frac{1}{2}\right)^0 = 18.8\%$$

18. A dice is rolled 6 times. Find P (at most 2 occurrences of three).

$$P(0) + P(1) + P(2) \rightarrow 6C_0 \left(\frac{1}{6}\right)^0 \left(\frac{5}{6}\right)^6 + 6C_1 \left(\frac{1}{6}\right)^1 \left(\frac{5}{6}\right)^5 + 6C_2 \left(\frac{1}{6}\right)^2 \left(\frac{5}{6}\right)^4 = 93.8\%$$

19. What is the fifth term for  $(2x + 5)^6$ ?

$$6C_4 (2x)^2 (5)^4 = 15 \cdot 4x^2 \cdot 625 = 3750x^2$$

20. What is the middle term of  $(4x^2 - 3)^8$ ?

$$8C_4 (4x^2)^4 (-3)^4 = 70 \cdot 256x^8 \cdot 81 = 1451520x^8$$

A hospital administrator collected data over a seven month period concerning the number of evening room calls made by patients. Let  $x$  represent the number of calls received by the nurses.

$x$ = number of calls	36	37	38	39	40	41	42	43	44	45
Probability	0.03	0.05	0.05	0.10	.13	0.15	0.16	0.13	0.12	0.08

21. What is the probability that 40 calls were made in a single night

$$1 - (.03 + .05 + .05 + .10 + .15 + .16 + .13 + .12 + .08) = .13 \text{ or } 13\%$$

22. What is the probability that 37 calls were made in a single night?

$$.05 \text{ or } 5\%$$

23. What is the probability that at least 42 calls were made in a single night?

$$.16 + .13 + .12 + .08 = .49 = 49\%$$

24. What is the probability that at most 39 calls were made in a single night?

$$.03 + .05 + .05 + .10 = .23 = 23\%$$

25. On a typical night, how many calls would you expect to be made?

$$36(.03) + 37(.05) + 38(.05) + 39(.10) + 40(.13) + 41(.15) + 42(.16) + 43(.13) + 44(.12) + 45(.08) = 41.27 \text{ calls}$$