

Name:

### 6-A Counting Methods

1. Calculate the following, if possible.

- a)  ${}_{12}C_4$                       b)  $\binom{12}{4}$                       c) 12 choose 4                      d) 4 choose 12
- e)  $\binom{30}{0}$                       f)  $\binom{30}{1}$                       g)  $\binom{30}{30}$                       h)  $\binom{30}{31}$
- i)  $\binom{8}{5}$                       j)  $\binom{8}{3}$                       k)  $\binom{8}{1}\binom{7}{1}\binom{6}{1}$                       l)  ${}_8P_3$

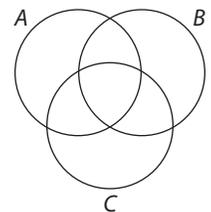
2. State the number of possible outcomes for the following events.

- a) rolling a 4-sided die and a 6-sided die                      b) rolling 4 6-sided dice
- c) drawing 2 cards                      d) drawing a card for Tyler and another card for Michael
- e) choosing 1<sup>st</sup> place, 2<sup>nd</sup> place, and 5 runners up out of 10 contestants                      f) putting the letters of the word CALCULUS in random order

### 6-B Set Notation and Venn Diagrams

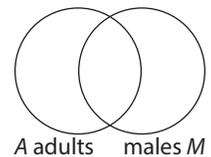
3. Shade the following regions of the Venn diagram at right as stated.

- a)  $(A \cup B \cup C)'$  in light pen                      b)  $(A \cup B) \cap C'$  in dark pen                      c)  $B \cup B'$  with diagonal lines



4. In a neighborhood of 80 people, 32 are adults, 38 are male, and 21 are boys. Put this information in the Venn Diagram at right, and state the number of people in the following sets.

- a) girls                      b) males or adults                      c)  $A \cap M$



### 6-C Probability of a Single Event

5. A drawer has 10 black pens, 7 of which are erasable, and 20 red pens, 4 of which are erasable. David pulls out three of the pens at random. Find the following probabilities using set notation.

- a) The first pen is blue.                      b) The second pen is blue.
- c) The second pen is blue, given the first pen was blue.                      d) The first pen is blue, given the second pen will be blue.
- e) The first pen is blue or is erasable                      f) The first pen is red, given it is erasable.

### 6-D Probability of Specific Multiple Events

6. Find the following probabilities for David's three pens in #5.

- a) All three pens are red.
- b) None of the pens are red.
- c) All three pens are red, given the second pen is red.
- d) The first pen is red, the second pen is blue, and the third pen is red.

### 6-E Probability of General Multiple Events

7. Austin, Bonn, and Cooper each pull a random candy out of a bag with 12 candies in it. Seven of the candies are grape, three are lime, and two are strawberry. Calculate the following probabilities.

- a) All three candies are the same flavor.
- b) All three flavors are different.
- c) Austin's candy is grape and the other two are not grape.
- d) One of the candies is grape and the other two are not grape.
- e) At least one of the candies is grape.
- f) At least two of the candies are grape.
- g) Austin's candy is not the same flavor as Cooper's candy.
- h) Austin and Bonn get the same flavor, but Cooper's flavor is different.

8. Missa correctly predicts 2 out of 3 rolls on a 4-sided die. Identify or calculate the following values.

- a)  $n$
- b)  $r$
- c)  $p$
- d)  $q$
- e)  $(?)$
- f)  $p^r$
- g)  $q^{n-r}$
- h)  $(?)p^r q^{n-r}$

9. Calculate the probability of correctly predicting at least 2 out 3 rolls on a 4-sided die.

### 6-F Probability Distributions

10. Collin rolls three 4-sided dice.

- a) Make a histogram showing the probability distribution for number of 1's rolled.

- b) Calculate the expected value of the distribution.