

Name:

4-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) $\binom{8}{7}\binom{7}{6}$

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 Eric and another card for Tate

e) choosing 1st place, 2nd place, 3rd place, and 5 honorable mentions out of 25 contestants

4-B Probability of a Single Event

3. Anna buys 3 pencils from a pencil machine stocked with 10 orange pencils and 20 blue pencils. 8 of the orange pencils and 5 of the blue pencils have black erasers. Find the following probabilities.

a) The first pencil is orange.

b) The second pencil is orange.

c) The second pencil is orange given the first pencil was orange.

d) The first pencil is orange given the second pencil will be orange.

e) The first pencil is orange or has a black eraser.

f) The first pencil is orange given it has a black eraser.

4. Assume 3% of babies are born with a certain disorder. A test for this disorder turns out positive for 90% of babies who have the disorder and for 14% of babies who do not have it. Put the above information into the table below, and use it to find the following probabilities.

	B: test positive	B': test negative	Total
A: have disorder	_____ % of _____ % = _____ %	_____ % of _____ % = _____ %	_____ % + _____ % = _____ %
A': do not have disorder	_____ % of _____ % = _____ %	_____ % of _____ % = _____ %	_____ % + _____ % = _____ %
Total	_____ % + _____ % = _____ %	_____ % + _____ % = _____ %	100%

a) A random baby tests positive.

b) A random baby has the disorder and tests positive.

c) A random baby has the disorder, given he or she tests positive.

d) A random baby has the disorder, given he or she tests negative.

4-C Probability of Multiple Events

5. Find the following probabilities for Anna's three pencils (see #3).

a) All three pencils are orange.

b) At least one of the pencils is blue.

c) All three pencils are the same color.

d) All three pencils are orange given the second pencil is orange.

e) The first two pencils are not the same color as each other.

f) At least one of the pencils has a black eraser.

4-D Expected Value

6. Jackson bets \$10 and rolls a 6-sided die twice. If the first roll is a 1, he wins \$30. If both rolls are 6, he wins \$150. Calculate the expected value for the following.

a) Jackson's gain each time he plays

b) Jackson's overall gain if he plays 10 times

c) the casino's overall gain if Jackson plays 10 times

d) an estimate for the casino's earnings per hour, per player