6-A   Counting Methods
1. Write the 10th row of Pascal's triangle.

2. Calculate the following, if possible. Do all calculations mentally.
a) $_{12}C_3$ b) $\binom{12}{3}$ c) 12 choose 3   d) 3 choose 12

e) $\binom{30}{0}$ f) $\binom{30}{1}$ g) $\binom{30}{30}$ h) $\binom{30}{31}$

i) $\binom{8}{2}$ j) $\binom{8}{6}$ k) $\binom{7}{1}\binom{6}{1}\binom{5}{1}$ l) $_7P_3$

3. 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 Rianna and another card for Nika

e) choosing 1st place, 2nd place, and 5 runners up out of 25 contestants   f) putting the letters of TENNESSEE in a random order

6-B   Probability of a Single Event
4. A drawer has 5 blue pens, 4 of which are erasable, and 20 red pens, 13 of which are erasable. Let B be the set of blue pens, and let E be the set of erasable pens. State the following probabilities using probability notation.
a) A random pen is blue.   b) A random pen is erasable.

c) A random pen is red and erasable.   d) A random blue pen is erasable.

e) A random erasable pen is blue.   f) A random pen is blue or erasable.

6-C   Conditional Probability
5. Heather pulls three random pens out of the drawer in #4. State the following probabilities.
a) The second pen is blue   b) The second pen is blue, given the first pen is blue.

c) The first pen is blue, given the second pen is blue.   d) The third pen is blue, given it is erasable.

e) The second pen is blue, given Jackson later pulls out four random pens and they are all red.

6. 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 the 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.

6-D   Probability of Specific Multiple Events
7. Find the following probabilities for Heather's three pens.

a) All three pens are blue.

b) None of the pens are blue.

c) All three pens are blue, given the second pen is blue.

d) The first pen is red, the second is blue, and the third is red.

6-E   Probability of General Multiple Events
8. Rianna, Kyley, and Amira each get a random cookie from a cookie jar that has 8 chocolate chip cookies, 5 oatmeal cookies, and 2 lemon cookies. Calculate the following probabilities.

a) All three cookies are the same.

b) All three cookies are different.

c) Kyley's cookie is oatmeal and the others are not.

d) One of the cookies is oatmeal and the others are not.

e) At least one of the cookies is oatmeal.

f) At least two of the cookies are oatmeal.

g) At least two of the cookies are oatmeal, given Kyley's is oatmeal.

h) At least two of the cookies are oatmeal, given at least one of them is.

i) At least four of the remaining cookies are oatmeal.