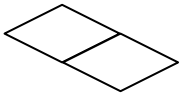
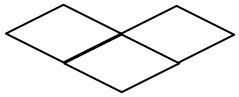
For #1-3, CIRCLE THE LETTER OF THE CORRECT ANSWER.

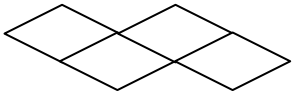
(7 pts)1. Find a function rule for the number of toothpicks to make Shape *n* in the following pattern:



Shape 1



Shape 2



Shape 3

A. $3+4n$

B. $4+4n$

C. $4+3n$

D. $3+3n$

E. None of the above

(7 pts)2. On Elm Street, there are 27 houses of which 8 do <u>not</u> have a garage. Morgan lives on Elm Street. Determine the odds in favor of Morgan living in a house that <u>has</u> a garage.

A. $8:19$

B. $19:27$

C. $8:27$

D. $27:35$

E. $19:8$

(7 pts)3. Of these three statements, which are referring to a population parameter?

I. In Mr. Hobson's fifth-grade class, cats are the favorite pet of 55% of the students.

II. The newspaper surveyed voters in the city of Chicago and found that 48% are opposed to the school funding proposal.

III. The average GPA of all current members of a certain sorority is 3.24.

A. II only

B. III only

C. I and II only

D. I and III only

E. II and III only

(8 pts)4. In an arithmetic sequence, each entry after the first is obtained by adding a fixed number to the previous entry. Fill in the blanks for this arithmetic sequence:

2.4, 3.1, 3.8, 4.5, _____, _____, _____; the 20^{th} entry is: _____

Complete this sentence: In a geometric sequence, each entry after the first is obtained by

_____

Make up a geometric sequence that begins with the number 3 and list the next 5 entries:

3, _____ , _____ , _____ , _____ , _____

(6 pts)5. Suppose $g(x) = 5x + 2$ and $h(x)$ is defined by the process of adding 3 to the input and then doubling that sum. Give the output if 2 is the input to:

a) first $h(x)$, then $g(x)$

Answer: _____

b) first $g(x)$, then $h(x)$

Answer: _____

(8 pts)6. For the experiment of tossing a pair of dice, determine which of the following could be considered outcomes. For those, circle the word "outcome." Otherwise, circle the word "event."

a) Getting a sum of ten OUTCOME EVENT

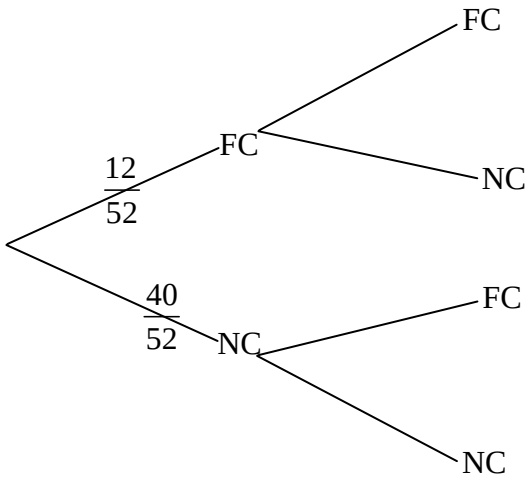
b) Getting doubles OUTCOME EVENT

c) Getting two 3s OUTCOME EVENT

d) Getting a sum of twelve OUTCOME EVENT

(8 pts)7. The tree diagram represents the experiment of selecting a card from a standard deck with face cards jack, queen, king, in each suit; <u>not</u> replacing it; then selecting another. Fill in the probabilities for the second set of branches. Simplify all fractions.

FC = face cards; NC = number cards



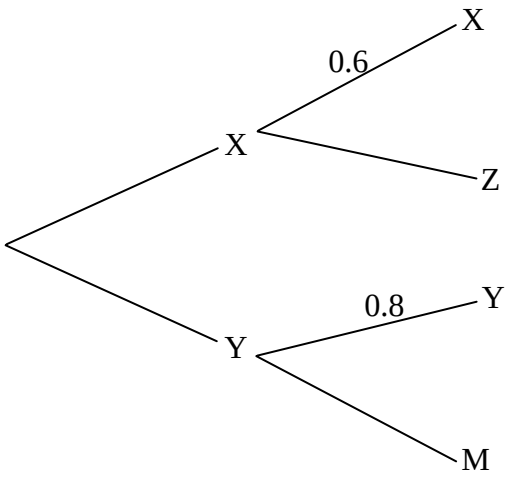
(6 pts)8. The table given represents a set of randomly selected digits from 1- 4 to simulate drawing marbles from a bag containing 1 yellow and 3 green marbles. A marble is drawn, replaced in the bag, and then a second marble is drawn. This process is done 20 times. If the digit 1 represents drawing a yellow marble and the digits 2, 3, and 4 represent drawing a green marble, find the indicated <u>experimental</u> probabilities according to this table. Express your answers as percents.

first draw	3	1	2	1	4	3	3	2	1	1	3	1	4	3	3	3	4	1	1	2
second draw	4	2	2	4	1	2	2	1	3	4	3	1	3	2	1	3	1	4	4	4

P(GY) =

P(GG) =

(9 pts)9. For some unusual 2-step experiment, only the data below are given. Fill in all missing probabilities on the branches and then complete parts a and b.



P(YY) = 0.24

a) P(XZ) =

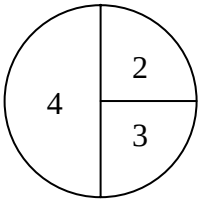
b) P(YM) =

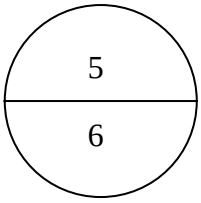
(6 pts)10. If you pick a book at random from Washington School library, P(red cover) = 0.2 and P(fiction) = 0.4. Assume independence of the two events. Show your work or otherwise justify your answer.

a) P(red cover *and* fiction) =

b) P(red cover *or* fiction) =

(12 pts)11. Experiment: Spin Spinner 1, note the number. Then spin Spinner 2 and note the number.





Make a tree diagram for this experiment with probabilities on the branches of the tree.
Include the sample space for the experiment and the associated probabilities. Use simplified fractions.

Tree diagram Sample Space Probabilities

P(first spin is an even number) =

P(the sum of the two spins is 9) =

Show the use of the Addition Rule for Probability to find:
P(first spin is an even number *or* the sum of the two spins is 9) =

(8 pts)12. A company has collected data on the numbers of male and female employees who did or did not graduate from college. The data are summarized in the table.

	College Graduate	Not a College Graduate	
Male	198	9	
Female	190	3	

If an employee is selected from this company, find the given probabilities.
Express your answers as simplified fractions.

a) P(female and college graduate) =

b) P(female or college graduate) =

c) P(female | college graduate) =

d) P(college graduate | female) =

(8 pts)13. Suppose Coolidge University wants to find out from the whole student body whether they support adding a swimming pool to the recreation center. Circle the specific type of sampling for each of the following and discuss each in terms of bias (say more than "biased" or "not biased").

a) A notice in the student newspaper invites all students to email their opinions.

Type of sampling: CLUSTER VOLUNTARY

Bias?

b) Randomly select a group of freshmen, a group of sophomores, a group of juniors, and a group of seniors and poll them for their opinion.

Type of sampling: STRATIFIED CONVENIENCE

Bias?